October 1983 An independent magazine published by ECC Publications

sinclair user

140 pages for only 75p

Issue No 19

SPECIAL OFFER: SAVE £1 ON SPECTRUM SOFTWARE

DANCING WITH THE SPECTRUM

User of the month

Microdrive reviewed in depth

Eighty shades of colour

Backgammon played the Sinclair way

Maths on the ZX-81

New rival for the Spectrum

Sixteen pages of the best program listings

NEW: SPECIAL SECTION FOR BEGINNERS

WIN A MICRODRIVE

COMPETITION-PRO Joystick

PRECISION GAME CONTROL!

SPECTRUM JOYSTICK NOW AVAILABLE FROM WHSMITH Boots

SEE US AT THE PCW SHOW STAND 279

Access
BARCLAYCARD VISA

Outstanding Features

- Self centreing stick
- Super strong nylon and steel construction
- A total of 8 directions *plus* 2 large fire buttons (for left or right handed operation)
- Arcade proven moulded leaf switches ensure incredible reliability
- Complete with boxed interface on Spectrum models
- A wide range of Joystick compatible software readily available from W H Smith and leading computer shops or direct from us

NEW

Conversion Tape I Only £4·95 – Converts seven leading arcade games to run with the Kempston Joystick: Horace Goes Skiing – Sinclair, Hungry Horace – Sinclair, Flight Simulation – Sinclair, Arcadia – Imagine, Penetrator – Melbourne House, Spectres – Bug Byte, Space Zombies – Mikrogen.

ALSO

Conversion Tape II Only £4·95 – Converts: Orbiter – Silversoft, Escape – New Gen, Tanx – DK 'Tronics, Centipede – DK 'Tronics, Spectral Invaders – Bug Byte, Cruising On Broadway – Sunshine, Frenzy – Quicksilva (Early Versions).

Joystick Compatible Spectrum Software now available from Kempsoft:
■ Astro Blaster ■ Blind Alley ■ Cosmic Guerilla ■ Cosmos ■ Cyber Rats ■ ETX ■ Frenzy ■ Frogger ■ Galaxians ■ Gulpman ■ Jet Pac ■ Joust ■ Knot in 3D ■ Mazeman ■ Meteoroids ■ Night Flite ■ PSSST ■ 3D Tunnel ■ Time Gate ■ Slippery Sid ■ Spookyman ■ Sheepwalk ■ 3D Painter ■ Bozy Boa ■ Violent Universe ■ Cookie ■ Tranz Am

Hardware I wish to order the following:		AMOUNT
☐ **New** Spectrum Joystick Interface, allows you to use any Atari/Commodore type joystick with Spectrum	@ £15·00	
☐ Spectrum Joystick including interface	@ £24·99	
☐ VIC 20, Commodore 64, Atari 400/800 Joystick	@ £14·50	
Please tick appropriate boxes All prices include P&P and VAT. Overseas prices add £4·00 P&P	TOTAL	

Cheques/postal orders should be made payable to Kempston (Micro) Electronics Ltd
Please debit my Access/Visa* Account (*delete as applicable)

Account No _____

Signature _____ Name _____

Address _____

Please post to Kempston (Micro) Electronics, Dept SU10
Unit 30 Singer Way, Woburn Road Industrial Estate,
Kempston, Bedford.

SOLE UK DISTRIBUTOR

KEMPSTON MICRO ELECTRONICS

Contents

sinclair user

incorporating Spectrum User

Editor
Nigel Clark

Consultant editor
Mike Johnston

Production editor
Harold Mayes MBE

Software editor
John Gilbert

Program reviewer
Rebecca Ferguson

Illustrator/Designer
Brian King

Advertisement manager
John Ross

Sales executive
Annette Burrows

Editorial assistant
Margaret Hawkins

Production assistant
Dezi Epaminondou

Managing director
Terry Cartwright

Chairman
Richard Hease

Sinclair User is published monthly by ECC Publications Ltd.

ABC

Telephone
All departments
01-359 3525

If you would like to contribute to any of the Sinclair User group of publications please send programs, articles or ideas for hardware projects to:
Sinclair User and Programs,
ECC Publications,
196-200 Balls Pond,
London N1 4AQ

Programs should be on cassette and articles should be typed. We cannot undertake to return them unless a stamped-addressed envelope is included.
We pay £10 for the copyright of each program published and £50 per 1,000 words for each article used.

© Copyright 1983
Sinclair User

ISSN No 0262-5458

Printed and typeset by
Cradley Print PLC,
Warley,
West Midlands

Distributed by
Spotlight Magazine Distribution Ltd,
1 Benwell Road,
Holloway,
London N7
01-607 6411

5 SINCLAIRVOYANCE We consider the arrival of the Microdrive and the possible effect it will have on the market.

11 SINCLAIR USER CLUB Games for the ZX-81 and Spectrum are among the offers this month.

15 NEWS Adaptations to the Micronet adaptor allow it to be used with the Microdrive; Sinclair expands its software interests; a new competitor for the Spectrum; and much more.

19 LETTERS Another wide variety of views and tips from our readers.

27 HARDWARE WORLD In a special section our writers review the Microdrive from different viewpoints.

37 SOFTWARE SCENE Improved graphics on the ZX-81 and more games for the Spectrum are considered by John Gilbert.

48 BACKGAMMON John Lambert assesses the abilities of the three versions for the Spectrum.

55 COMPETITION Win one of the first Microdrives in our difficult contest for Spectrum owners.

51 SPECIAL OFFER £1 voucher to exchange at Rumbelows stores against Sinclair software.

63 PROGRAM PRINTOUT Another 16 pages of listings for the Spectrum and ZX-81 in a section which is easy to take out and file.

84 USER OF THE MONTH The Entwistle family do their best to get the most from their ZX-81.

93 FORTH In the second part of his series, John Gilbert discovers why the language is so popular.

99 PROGRAMMING Increasing the range of colours is easy, according to Jack Knight.

106 MATHEMATICS Do complicated calculations on the ZX-81.

NEW

111 BEGINNERS' SECTION New this month. We hope to make the introduction to the Sinclair machines as smooth as possible by giving a few hints and some easy programs to enter.

120 HELPLINE Our expert, Andrew Hewson, digs into his postbag for more problems to answer.

129 MIND GAMES Quentin Heath visits Espionage Island to rescue some of our readers.

135 SOFTWARE DIRECTORY The second part of our guide to software for the Sinclair machines, complete with the Gilbert Factor.

NEXT MONTH

John Gilbert compares the growing number of compilers for the ZX-81 and the Spectrum and there is another special gift for readers of *Sinclair User*.

"IT LOOKS NICE BUT WHAT THE HELL CAN I DO WITH IT?"

Every ZX SPECTRUM Print'n'Plotter Jotter has 100 pages of finely printed screen grids.

50 for the high resolution screen. 50 for the normal character screen.

With these at your disposal you can plan practically any graphics print-out to program into your computer.

The high-resolution PLOT grid shows every one of the 45,060 pixels! Every one printed. Every one with its co-ordinate numbers. This gives you enormous graphics power to DRAW, PLOT, CIRCLE, PLOT OVER and so on in any position or screen building up graphic drawings, charts, maps . . . in fact anything without the complications of guesswork, integer out of range, or wrongly positioned pixel colours which change PRINTed INK characters!

The normal character PRINT grids on the other hand will allow you to be specific about PRINT AT, TAB, PRINT OVER, SCREEN$ and INK/PAPER in direct co-ordination with PLOT . . . you see every page is printed on **high quality tracing paper** . . . ideal to overlay on to illustrations and 'copy' or co-ordinate.

And there's another bonus, because each page contains 24 User-definable grids — **2400 per pad!**

With 50 pages of PLOT grids, 50 pages of PRINT grids 2400 user-definable grids, a set of colour pens, a printed PIXEL RULER and our Special Offer of demo programs, IT'S THE BEST VALUE IN ZX GRAPHICS PROGRAMMING.

"NOW WHICH KEY DO I PRESS TO SHOOT DOWN THE THING FROM MARS?"

Ever forgotten which key to press when playing a game?
Do you suffer from a mind-boggling mass of programmed keys?
Do you write programs that use different keys to perform various functions? If so, we have just the thing for your ZX SPECTRUM.

A pack of Print'n'Plotter Keyboard Overlays.

Just write the function or functions under each key you program and keep the overlay for the next time you play the game.
Of course there's lots of more uses you will find for our OVERLAYS, user defined characters, keyboard scanners, mathematical programs, business uses — to name just a few.

There's TEN OVERLAYS to a pack — so you can program with impunity! And they fit perfectly onto your standard ZX SPECTRUM KEYBOARD. Each OVERLAY is printed with the cursor movement key directions and there's room for program name etc.

A SPECTRUM CONSOLE THAT EVERYONE CAN AFFORD!

For the cost of a 'games' cassette you can have a truly professional console for your SPECTRUM!

We've cut costs (not cut quality) by designing a self-assembly method using relatively inexpensive materials like strong corrugated board.

The result is a console that's tough, light, highly finished and capable of giving years of useful service.

Facilities include ergonomic keyboard angle, access to rear of machine, choice of P.S.U. internal or external, and alternative of Printer on-board or cassette storage area. Fully illustrated instructions are included.

"PRINTER PAPER THAT WORKS? I DON'T BELIEVE IT!"

Five rolls of our PRINTER PAPER will only cost you £12.50 including postage, packing and VAT! And you'll gain a great deal more!
It prints beautifully. It's not too thick. It's not too shiny. Print is black — not grey. It actually feeds through the machine!
See for yourself only £12.50 including everything. It's a bargain!

Post today to Print 'n' Plotter Products, 19 Borough High Street, London SE1 9SE or phone: 01-403 6644 (General) or 660 7231 (Credit Card Sales).

Name: .....

Address.....

.....

.....

SD

.... ZX SPECTRUM JOTTER @ £9.95 each
.... ZX SPECTRUM KEYBOARD OVERLAYS @ £2.95 per pack
.... ZX SPECTRUM CONSOLE @ £5.25 each
.... ZX PRINTER PAPER @ £12.50 per five rolls
.... ZX SPECTRUM DEMO CASSETTES @ 95p each
.... ZX81 JOTTER PADS @ £3.50 each
.... ZX81 FILMS @ £2.25 each
.... ZX81 GRAPHICS PROGRAMMING GUIDE @ £1.50 each

Remittance enclosed. Please bill my Access/Barclaycard/Visa/Mastercard No:

All prices include VAT, P&P. Overseas orders please add 25% for additional surface mail.

"WHERE CAN I GET THEM?"

You can see and buy most of our products at:
W. H. Smith (Computer Stores)
Boots (selected branches)
Buffer Micro (Streatham 01-769 2887)
Microware (Leicester 0533 29023)
Dennys Bookshops (London EC1 01-253 5421)
Personal Computer Services (Darwen Lancs 0254 776677)
Telford Electronics & Computing (Shifnall 0952 460008)
Georges Bookshop (Bristol 0272 276602)
Microtech Systems (Gillingham Kent 0634 571321)
Northampton Home Computer Centre (0604 22539)
Philip Copley Hi Fi (Ossett W. Yorks 0924 272545)
Darlington Computer Shop (Darlington 0325 487478)
Lancashire Micros (Morecambe Lancs 0524 411435)
North East Computers (Peterhead 0779 79900)
Photo-Video (Hereford 0432 267997)
Computers for All (Romford 0708 752862)
March Software (Sawbridgeworth Herts 0279 724341)
Evesham Micro Centre (Worcs 0386 48635)
Computer City (Widnes, Cheshire 051 420 3333)
Landau Electronics (Sutton 01-643 5494)
D&J Computers (Stevenage 0438 65501)
Software Machine (London SE3 01-305 0521)
Screen-Scene (Cheltenham 0242 28979)
Hobbyhorse (Lincoln 0522 35227)
Micro Home Computers (Orkney 0856 3283)

Educational Supplies through Griffin & George Ltd.
Australasian agents: Centrum Systems. Tel: (Perth) 4441031.

Sinclair now fixes demand

THE *Sinclair User* prediction for the autumn is that although the Microdrive has been launched they will be rarer than swallows in winter until at least the beginning of next year. That is not one of the most difficult predictions ever made in this column. The sales method chosen for the new add-on means that the growth in sales will be gradual rather than the usual mad scramble associated with earlier launches of Sinclair Research equipment.

We congratulate the company on the way it has been able to learn from its past mistakes. We did not expect, though, that such an education would result in such an unusual method of making sure that nobody's expectations were raised unnecessarily. Most companies in the position of Sinclair Research would have ensured sufficient items to meet the expected demand, tailoring supply to demand. Sinclair has approached it from the other side and made demand fit the supply.

Such a course of action is only possible and indeed only sensible when a company finds itself in the position of Sinclair Research. As in the past it has another product which is exceptional, which means that previous experience, both in the company and outside it, can give only an inexact guide to likely demand.

Initial orders for Sinclair computers have far outstretched supply when they have been first launched. It would seem sensible therefore to make sure that production and stocks are high enough to cope with the expected demand.

There is no guarantee, however, that even with a smooth production line and large stocks that demand would not again be far larger than expected and that the problems of 1982 would be repeated.

The alternative is to follow the example of Sinclair and keep a tight rein on demand by limiting the number of order forms which are sent to possible customers and delaying general release on retail sale until it has been able to gauge the possible market. In that way it is able to build production and overcome problems which almost inevitably occur when making something new, while avoiding causing disappointment and frustration by limiting sales to the amounts it knows can be dealt with within 28 days..

The chosen few are so limited at the moment that we at *Sinclair User* have yet to meet anyone who has received an order form, let alone placed an order.

It is a sales method which has limited applications. The firm involved must have some way of contacting its expected clients and there must be little or no competition. Sinclair scores on both points. Through its long-established policy of selling by mail order it has the names and addresses of thousands of owners of Spectrums and there is no-one else producing anything like the Microdrive.

It can thus afford the time to keep its possible customers waiting in the knowledge that there is nowhere else for them to go in the immediate future.

The concern must be that many people might not see any point in investing in the Microdrive and its associated interfaces while there are so few around. The network facility is of little use when there are very few other enthusiasts with whom to communicate and many people will want to see what professional software is available on the cartridges before deciding to take the plunge and spend £80.

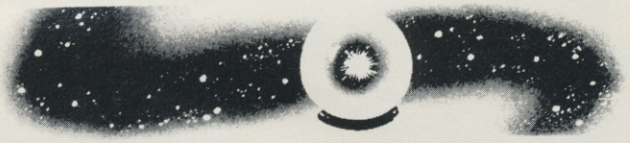
With the amount of such software being sparse for some time that leaves the RS232 interface as being the only reason for buying the system immediately. To follow that line of argument to its logical conclusion would mean a very slow take-off for Microdrive sales. With initial orders being slow, production would not be increased so fast as it might otherwise have been. That would lengthen the time people would have to wait for an order form, thus making more people reluctant to buy one — and again production would be restricted.

Obviously that would not be good for sales and even worse for Sinclair Research, which will be wanting to recoup research and development costs as quickly as possible.

It is not, however, something which we expect to happen. We believe there is a ready market for the Microdrive and its interfaces and that, provided it does not suffer from the usual unseen teething troubles and that output can be increased rapidly, there will be plenty of demand, with early machines possibly being re-sold at a premium and there being a ready market for order forms.

Such a situation would, of course, cause the information on the likely demand for Microdrives to be inaccurate. If everyone who receives an order form buys a Microdrive to re-sell it or sells the form to someone who wants to buy one the response will be greatly over-stated. No doubt Sinclair Research will be keeping a close watch on that.

Bearing all that in mind, it would appear now almost certain that no other computer will be launched in Britain by Sinclair until early next year. The Microdrive and the company's closer involvement in the development of software should keep it busy for the next few months. We also understand that there are no plans for introducing the Timex Sinclair 1500 on to the British market. The idea was considered but later rejected as it was thought impossible to fit between the ZX-81 and the Spectrum.



With interest in the ZX-81 appearing to wane in Britain it could also mean that Sinclair will be concentrating purely on the Spectrum and letting the ZX-81 drift into retirement. Despite the many uses which have been found for the ZX-81, and our Users of the Month are ingenious in their efforts to explore the possibilities of the machine, the games-dominated market prefers colour, a little sound and larger memory.

One market which might alter those calculations about the little machine is education. As a headmaster said in our letters column in the last issue, while children's appetites for computers and programming were being whetted at school, their parents still could not afford any of the machines at the moment and thus could not continue the interest at home.

Should the price of the ZX-81 fall further, and the recent Starter Pack offers seems to indicate that it could, then a large market, untapped so far, would be discovered. Link such a move to the determination of Sinclair Research to improve the level of software for the education market and the ZX-81 may find a new lease of life.

It could lead to new generation growing up with a completely new conception of what computers should look like and of what they should be capable. No longer would a proper keyboard be expected as a basic requirement or that it should be so large that it would be impossible to put into a schoolbag easily. In the meantime we shall wait to see if the Microdrive can live up to expectations.

At last...
A joystick that works!

The **intelligent** Joystick

Cambridge Computing bring you the first **programmable** joystick~ at a price you can afford.

£29.90
JOYSTICK, INTERFACE AND TAPE COMPLETE

Interface

- 1k on board memory
- Own rear edge connector – for printers etc.,
- Compatible with all standard joysticks

Joystick

- Self centring
- 8 Directional microswitched action
- 2 independent fire buttons

Tape

- Easy to use program enables the interface to work on ALL software
- Keeps a record of all your games – so you only need to tell it about each game once!

CAMBRIDGE COMPUTING

1 Benson Street, Cambridge CB4 3QJ
Telephone 0223 322905

Please send me:-
Joystick, Interface and Tape at £29.90 ___
Interface and Tape at £24.00 ___
Joystick only at £7.00 ___
For Spectrum
I enclose cheque / postal order* for £.....
made payable to Cambridge Computing Limited.
*delete as necessary.

explore the mysterious world of Artic Adventures

NEW

E The Golden Apple

48K Spectrum
You must set out on a quest to find the 'Golden Apple'. On your journey you will pass through mansions, travel overseas and onto an island, hunting your treasure.

ZX Spectrum Adventures £6.95
ZX 81 Adventures £5.95

All these games are instant-response machine code programs. Adventures B, C and D include cassette save routines.

Artic Computing Ltd.
Main Street, Brandesburton,
Driffield YO25 8RG.
10% Discount for 2 and 15% for 3 or more.
Cheques and P.O.'s made payable to Artic Computing Ltd.
Dealer enquiries welcome.
Please state whether your order is for ZX81 or SPECTRUM.
Access and Barclaycard welcome.

Send S.A.E. (9 in × 6 in) for FREE catalogue of our wide range of programs

16/48K ZX/Spectrum
16K ZX81
You find yourself stranded on a strange alien planet. Your aim is to escape by finding your captured space craft. But beware of the little green man who may get to you!

48K Spectrum
16K ZX81
You are in the middle of a South American jungle when you stumble across a strange Inca temple. Enter it to collect treasure and then try to return. But beware don't let greed be your downfall.

48K Spectrum
16K ZX81
While on a reconnaissance mission you are drawn to an alien cruiser on a humanoid slave mission. Try to escape from aggressive aliens, luscious androids and drunken barmen. Your only help is Fred the friendly android.

48K Spectrum
16K ZX81
You have to survive an engine failure while flying over an apparently uninhabitated island in the South Atlantic. Use your wits to harass the enemy, but treat the beautiful native women with respect, to escape from the island and return to an allies aircraft carrier.

WARNING: These programs are sold according to ARTIC COMPUTING LTD's terms of trade and conditions of sale. Copies of which are availabe on request.

ARTIC COMPUTING LTD.
Main Street, Brandesburton,
Driffield YO25 8RG.

Please rush me:
*Adventure A☐ B☐ C☐ D☐ E☐
*for my ZX81 £5.95 /SPECTRUM £6.95

I enclose a cheque for £ _____
or debit my Barclaycard/Access account

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

NAME _____

ADDRESS _____

*Tick, delete or complete as applicable.

THE WIZARD'S WARRIORS: A fast moving game that matches developments in your skill as a player by becoming increasingly more devious. By offering to you the full range of options you can choose how to control your warrior throught the maze. A full implementation of this program enables such features as a continuous series of sound effects, arcade quality graphics, double-point scoring, and-for the very artful-bonus lives — **Spectrum £4.95**

FORTH: A full implementation. Ideal for writing fast moving arcade type games. Allows the full colour and sound facilities of the Spectrum to be used. Future Microdrive enhancements will be made available. — **Spectrum £14.95**

ADVENTURE ONE: Features a save game routine as the game can take months to complete.
'A remarkably good version . . . well worth the money.' ...*Sinclair User*... — **ZX81 £5.95**

MAZEMAN: A fast action m/c game that reproduces the spirit of the original
'..is very accurate and fast.' ...*Which Micro?*... — **Spectrum £4.95**, **ZX81£4.45**

CHESS 1.4: Ten levels of play with this m/c program.
Good graphic screen display.
'In a class of it's own.' ...*Your Computer*... — **ZX81 £5.95**

INVADERS: Very fast m/c action. Includes mystery ship and increasingly difficult screens. — **ZX81£4.45**

7 MAES AFALLEN, BOW ST., DYFED, SY24 5BA

24hr Ansaphone 0970 828851

Access

Professional Software for ZX81 and Spectrum

SPECTRUM 48K

■ **Payroll:** Weekly, monthly, hourly. All tax codes, and pay levels. Guaranteed correct. £25.00 ■ **Statutory Sick Pay:** Better than programs costing 10 times as much on other machines. £40.25 ■ **Stock Control:** Over 1500 lines. Find, add, delete, in 2 seconds! Sinclair or full-width plain paper printer (with interface) supported. £25.00 ■ **Spectrum Demo Tape:** Demonstration versions of payroll, stock control, SSP. On one tape. £3.95 ■ **Critical Path Analysis:** Enter network of over 500 activities. Program finds critical path. Durations and costs can be modified, and the calculation repeated. Full-width printer supported. £15.00

SPECTRUM 16K (usable on 48K)

■ **Mortgage:** See how repayment amount affects duration and total amount paid. While paying: see how much interest and how much capital you are paying. Month-by-month table printed. On the same tape – ■ **Loan:** Calculates true interest when paying instalments etc. £8.00 (both programs together)

Parallel Printer Interfaces:

■ **The Standard Interface:** Centronics interface to link your ZX Spectrum to many popular dot matrix and daisywheel printers. The package includes: interface, simple word processor, 3 sets (different) of printer software, cable, centronics plug, full instructions. The **LLIST** and **LPRINT** commands are supported. Many other features also. £45 inc. VAT. Post free. ■ **The Deluxe Interface:** Includes all the features of the standard package, and also has a 3.5 mm jack socket and special circuitry which allows the ZX Spectrum to **Save** and **Load,** without having to unplug or switch anything! £55 inc. VAT. Post Free. ■ **The Professional Interface:** Includes all the features of the deluxe package, but also allows the ZX Spectrum to be used as a very powerful peripheral processor for a bigger computer! Software is supplied which post-processes word processor output with straight right and left margins. £99 inc. VAT. Post Free.

Tape Loading Problems With Your Computer?

■ **The Microcomputer User's Book of Tape Recording:** Is a practical guide to help you get programs in and out of your computer. Written for the computer user – but several audio and computer professionals have found it useful! ISBN 0 946476 00 4. ONLY £3.15 incl. postage (£2.90 in shops) ■ **Test and Alignment Cassette:** Tape loading problems are often due to a mis-aligned tape head. Align your tape head by ear with our tape – no instruments required! £4.90 ■ **Loading Aid:** Allows you to get tape playback level right first-time. Helps with dropouts and to ease tape quality too! Standard model £5.95, De luxe model £7.95

ZX81 16K

■ **Beamscan:** Computers bending moment and shear force diagrams for a simply supported beam with 1-99 point, uniform and uniformly tapered loads. £25.00 ■ **Time Ledger:** For up to 17 employees, 200 clients. £15.00 ■ **Optimax:** A powerful linear optimisation program up to 75 variables <,=>, constraints. £40.00 ■ **Payroll:** As above but only up to 30 employees. £25.00 ■ **Stock Control:** As above but 400 stock lines in 16K or 2000 lines in 64K. £25.00 ■ **Critical Path Analysis:** Up to 500 activities in 16K. Over 500 activities in 48K. £15.00 ■ **Budget:** Keeps track of expenses and compares with budget. 50 headings plus 12 months or 12 categories. £15.00 ■ **Financial Pack:** Contains three programs: Mortgage, Loan and VAT £8.00

All items are post free and include VAT. Programs are supplied with comprehensive manuals.

Remember – We at Hilderbay pride ourselves in the development of high quality professional software that is fully functional and with full support. Not fancy packaging, fancy prices or fancy names.

Contact us now for further information on these products and our full range of Apple II Software.

TRADE ENQUIRIES WELCOME ON ALL PRODUCTS

Hilderbay

Professional Software

Hilderbay Ltd Dept. SU10 8-10 Parkway Regents Park London NW1 7AA
Telephone: 01-485 1059 Telex: 22870

EXCITING ADDITIONS FOR YOUR HOME COMPUTER

THE MAPLIN TALK-BACK for ZX81 and VIC20

Now your computer can talk

- ★ Allophone (extended phoneme) system gives unlimited vocabulary.
- ★ Can be used with unexpanded VIC20 or ZX81 — does not require large areas of memory.
- ★ In VIC20 version, speech output is direct to TV speaker with no additional amplification needed.
- ★ Allows speech to be easily included in programs.

Complete kits. Order As:
LK00A (VIC20 Talk-Back). Price £24.95.
LK01B (ZX81 Talk-Back). Price £19.95.
Full construction details in Maplin Projects Book 6. Price 70p. Order As XA06G.

SOUNDS GENERATOR FOR ZX81

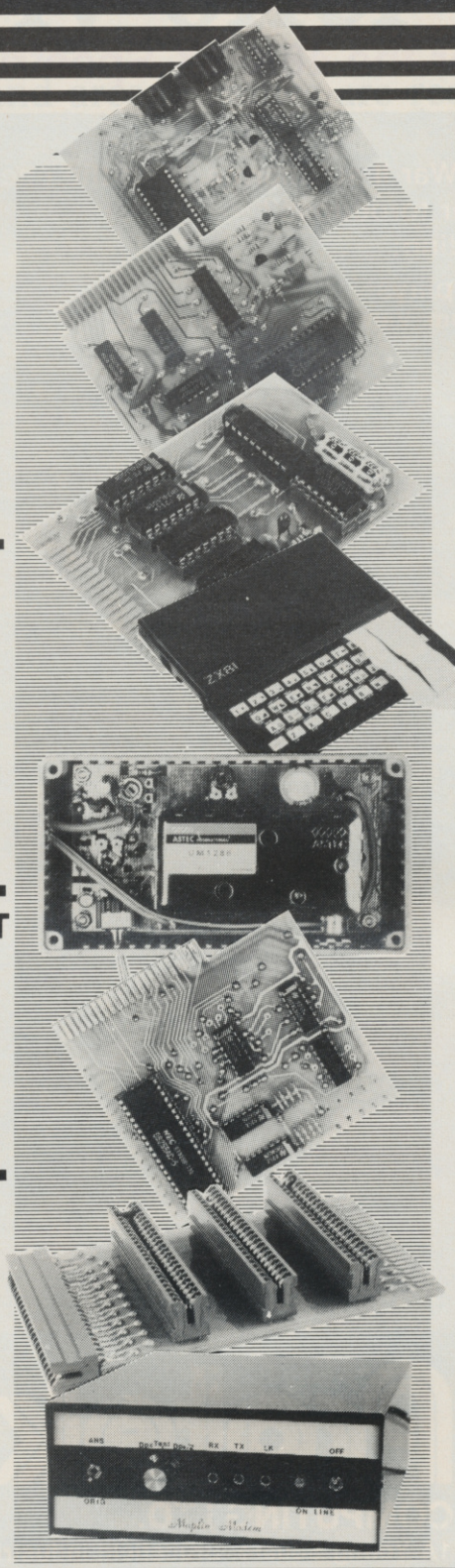
3-Programmable tone generators with programmable attenuators turns your ZX81 into a mini-synthesiser.
Noise generator with 3 pitch levels enables the creation of most special effect sounds.
Single address access via BASIC with PEEK and POKE. Connects directly to expansion port socket or motherboard.
Complete kit. Order As LW96E. Price £10.95.
Full construction details in Maplin Projects Book 5. Order As XA05F. Price 70p.

ZX81 INPUT/OUTPUT PORT

Two bi-directional ports for a total of 16 input or 16 output lines.
Includes one buffered output which can interface directly to CMOS.
On board address selection allows for expansion to 6 ports with two boards.
Complete kit. Order As LW76H. Price £9.25.
Full construction details in Maplin Projects Book 4. Order As XA04E. Price 70p.

MODEM

A CCITT standard modem that connects directly to your telephone line via a B.T. approved transformer. Transmits and receives simultaneously on European standard frequencies at 300 baud. May be used to talk to any other 300 baud European standard modem including the Maplin Computer Shopping modem on 0702 552941 and any British Telecom Datel 200/300 Service modem.
The modem's computer interface is RS232 compatible.
A complete kit excluding case is available. Order As LW99H. Price £39.95.
Full construction details in Maplin Projects Book 5. Order As XA05F. Price 70p.



KEYBOARD with ELECTRONICS for ZX81

- ★ Full size, full travel keyboard that's simple to add to your ZX81 (no soldering in ZX81).
- ★ Complete with electronics to make "Shift Lock", "Function" and "Graphics 2" single key selections.
- ★ Powered (with adaptor supplied) from ZX81's own standard power supply.

Full details in Project Book 3 (XA03D). Price 70p
Complete kit (excl. case) £21.90.
Order As LW72P.
Case £4.95. Order As XG17T.
Ready built-in case £29.95.
Order As XG22Y.

ZX81 TV SOUND

ZX81 sound on your TV set.
Video reversing switch for normal or inverse video display. Can be used with the Talk-Back or Sounds Generator kits.
Complete kit. Order As LK02C. Price £19.95.
Full construction details in Maplin Projects Book 6. Order As XA06G. Price 70p.

ZX81 EXTENSION BOARD

Our ZX81 Extendiboard plugs directly into the ZX81 expansion port and will accept a 16K RAM pack and three other plug-in modules simultaneously. Parts are sold separately as follows:
PCB Order As GB08J. Price £2.32.
Edge Connectors (4 needed) Order As RK35Q. Price £2.39 each.
Track pins (1 pack needed). Order As FL82D. Price 85p per pack of 50.

INTERFACES for MODEM

Interfaces for most popular home computers which do not have RS232 ports will be available shortly. An interface for the ZX81 that includes a complete Machine Code Communications Program is available. Order As LK08J (ZX81 Modem Interface Kit). Price £24.95.
Full construction details in Maplin Projects Book 7. Order As XA07H. Price 70p.

MAPLIN

Maplin Electronic Supplies Ltd., Mail Order: P.O. Box 3, Rayleigh, Essex SS6 8LR.
Tel. Southend (0702) 552911 (Sales).

159-161 King St., Hammersmith, W6. Tel. 01-748 0926. 284, London Road, Westcliff-on-Sea, Essex. Tel. (0702) 554000. Lynton Square, Perry Barr, Birmingham. Tel. (021) 356 7292.
All prices include VAT & carriage. Please add a 50p handling charge to orders under £5 total value.

HUNTER-KILLER

For the 48K ZX Spectrum

Can you Captain a World War II submarine, hunt the enemy then destroy him with your torpedoes?
Realistic simulation including:

(a) 4 separate screen displays
(Control Room, Chart Room, View through Periscope, Navigation Chart)
(b) 18 control functions
(c) Quick kill option

Written by Rod Hopkins

£7.95

Sensational new two-computer option. Additional hardware required, available soon

AVAILABLE FROM MOST GOOD COMPUTER STORES

TRADE ENQUIRIES WELCOME

Protek

COMPUTING LTD.

1A Young Square, Brucefield Industrial Estate, Livingston, W. Lothian.

Subject to availability. Prices correct at time of going to press.

Free cassette bonus for early offer orders

Prices of adventure and arcade games are reduced by 20 per cent exclusively for members this month.

THIS MONTH the Club will be giving one free cassette to each of the first 40 people who apply for software on offer. The games being offered free are **Spectipede** for the 16K Spectrum and **Golf** for the 16K ZX-81. Both games are from R and R Software.

The ZX-81 Golf is usually sold at £3.75 but we are offering it at £3. It allows one or two people to play a nine- or 18-hole course. All the usual golfing hazards will be encountered, including water, trees and bunkers.

Spectipede, marked down from £4.95 to £3.96, is R and R's most recent game for the Spectrum. It is a full feature arcade version of the classic game and includes colour effects which are unusual on the machine.

The Club also has its usual software offers with prices cut by up to £2.

The first offer is **Star Trek** for the 48K Spectrum which is also from R and R. The game is one of the best versions of the original mainframe computer games, with graphics routines added to improve the action. The game has an interesting self-destruct mode which will end play if the Klingons get too close. It costs £3.75 normally but we offer it at only £3.

Gnasher, also from R and R, is marked down from £4.95 to £3.96. It is a colourful version of Pac-man with all the appropriate arcade effects. Everything in this game is bigger than in most other versions and the action is fast and smooth.

Two Martech games on offer, **Conflict** and **Galaxy Conflict,** are adventure games with a difference. Both games are offered at £9.56 instead of the retail price of £11.95. In Galaxy Conflict the computer moderates between two players who have to battle it out for control of the galaxy. In Conflict, the computer again plays the moderator as the human players struggle to control nations and annihilate each other.

All this month's offers have been marked down by 20 percent from their original retail prices. That means a saving of nearly £2 on some items.

The method of obtaining software on offer has changed this month. Instead of sending order forms to the companies concerned, all cheques and postal orders should be sent to the Club's new address at 196–200 Balls Pond Road, London N1 4AQ.

Mike Meek, Sinclair User Club organiser, is pleased with the way new members are joining, especially those from the former National ZX Users' Group. He is, however, alarmed that Club members are not writing to their Club headquarters with any information which would be of interest to other Sinclair users. Meek will always be interested to hear news from members, especially if it can be shared with the thousands of users who read the Sinclair User Club page.

The Club is continuing to provide services to its members, including the telephone help-line which can be reached by using the number on the Club newsletter cassette.

As usual, those services and offers are available only to members of the club. Anyone wishing to join and take advantage of the offers should include an order form with application.

	List price	Offer price
R & R Software		
ZX-81 16K		
Golf	**£3.75**	**£3**
Spectrum		
Golf	**£3.75**	**£3**
Star Trek	**£3.75**	**£3**
Spectipede	**£4.95**	**£3.96**
Gnasher	**£4.95**	**£3.96**
Martech		
ZX-81 16K		
Conflict	**£11.95**	**£9.56**
Galaxy Conflict	**£11.95**	**£9.56**
Spectrum		
Conflict	**£11.95**	**£9.56**
Galaxy Conflict	**£11.95**	**£9.56**

MEMBERSHIP FORM

I wish to join the Sinclair User Club and enclose my subscription of £12

Name .....

Address .....

.....

.....

.....

Which computer do you own?

ZX-81 ☐ Spectrum ☐

Send your coupons to Sinclair User Club, ECC Publications, 196-200 Balls Pond Road, London N1 4AQ. Cheques should be made payable to Sinclair User Club.

Sinclair User Club

Britain

Aylesbury ZX Computer Club: Ken Knight, 22 Mount Street, Aylesbury (5181 or 630867). Meetings: first Wednesday and third Thursday of the month.

Basildon Microcomputer Club: Roger Sims, Wickford 63032, after 6.30pm. Meetings every other week on Tuesdays from 7.30 to 10pm at Healey Management Services, The Hemmels, Laindon, Essex.

Bristol Yate and Sodbury Computer Club: 99 Woodchester Yate, Bristol, BS17 4TX.

Colchester Sinclair User Group: Richard Lown, 102 Prettygate Road, Colchester CO3 4EE.

Doncaster and District Micro Club: John Woods, 60 Dundas Road, Wheatley, Doncaster DN2 4DR; (0302) 29357. Meetings held on second and fourth Wednesday of each month.

Eastwood Town Microcomputer Club: E N Ryan, 15 Queens Square, Eastwood, Nottingham NG16 3BJ.

Edinburgh: Edinburgh Home Computing Club. John Palmer (031 661 3183) or Iain Robertson (031 441 2361).

EZUG-Educational ZX-80–81 Users' Group: Eric Deeson, Highgate School, Birmingham B12 9DS.

Furness Computer Club: R J C Wade, 67 Sands Road, Ulverston, Cumbria (Ulverton 55068). Meets every other week on Wednesday evenings.

Glasgow ZX-80–81 Users' Club: Ian Watt, 107 Greenwood Road, Clarkston, Glasgow G76 7LW (041 638 1241). Meetings: second and fourth Monday of each month.

Gravesend Computer Club: c/o The Extra Tuition Centre, 39 The Terrace, Gravesend, Kent DA12 2BA. Bi-monthly magazine and membership card.

Hassocks ZX Micro User Club, Sussex: Paul King (Hassocks 4530).

Inverclyde ZX-81 Users' Club: Robert Watt, 9 St. John's Road, Gourock, Renfrewshire PA19 1PL (Gourock 39967). Meetings: Every other week on Monday at Greenock Society of the Deaf, Kelly Street, Greenock.

Keighley Computer Club: Colin Price, Redholt, Ingrow, Keighley (603133).

Lambeth Computer Club: Robert Barker, 54 Brixton Road, London SW9 6BS.

Liverpool ZX-Computer Centre: Keith Archer, 17 Sweeting Street, Liverpool 2.

Merseyside Co-op ZX Users' Group: Keith Driscoll, 53 Melville Road, Bootle, Merseyside L20 6NE; 051-922 3163.

Micro Users' Group: 316 Kingston Road, Ewell, Epsom, Surrey KT19 0SY.

Newcastle (Staffs) Computer Club: Meetings at Newcastle Youth and Adult Centre, Thursday, 7.30 to 10 pm. Further information from R G Martin (0782 62065).

North Hertfordshire Home Computer Club: R Crutchfield, 2 Durham Road, Stevenage; Meetings: first Friday of the month at the Settlement, Nevells Road, Letchworth.

Northern Ireland Sinclair Users' Club: P Gibson, 11 Fitzjames Park, Newtownards, Co Down BT23 4BU.

North London Hobby Computer Club: ZX users' group meets at North London Polytechnic, Holloway Road, London N7 each Monday, 6pm.

Nottingham Microcomputer Club: ZX-80–81 users' group, G E Basford, 9 Holme Close, The Pastures, Woodborough, Nottingham.

Orpington Computer Club: Roger Pyatt, 23 Arundel Drive, Orpington, Kent (Orpington 20281).

Perth and District Amateur Computer Society: Alastair MacPherson, 154 Oakbank Road, Perth PH1 1HA (29633). Meetings: third Tuesday of each month at Hunters Lodge Motel, Bankfoot.

Regis Amateur Microcomputer Society: R H Wallis, 22 Mallard Crescent, Pagham, Bognor Regis, West Sussex PO21 4UU.

Scunthorpe ZX Club: C P Hazleton, 26 Rilestone Place, Bottesford, Scunthorpe; (0724 63466).

Sheffield: South Yorkshire Personal Computing Group. Enquiries to R Alderton (0742 20571), S Gray (0742 351440), P Sanderson (0742 351895).

Sittingbourne: Anurag Vidyarth (0795 73149). Would be interested to hear from anyone who wants to start a club near the Medway towns.

Stratford-on-Avon ZX Users' Group: Chris Parry, 16 Sackville Close, Stratford-on-Avon, Warwickshire.

Swansea Computer Club: B J Candy, Jr Gorlau, Killay, Swansea (203811).

Swindon ZX Computer Club: Andrew Bartlett, 47 Grosvenor Road, Swindon, Wilts SN1 4LT; (0793) 3077. Monthly meetings and library.

Sutton: Sutton Library Computer Club, D Wilkins, 22 Chestnut Court, Mulgrave Road, Sutton, Surrey SM2 6LR.

West Sussex: Midhurst and District Computer User Group. Enquiries to V Weston (073 081 3876), R Armes (073 081 3279).

Worle Computer Club: S W Rabone, 18 Castle Road, Worle, Weston-super-Mare BS22 9JW (Weston-super-Mare 513068). Meetings: Woodsprings Inn, Worle, on alternate Mondays.

ZX-Aid: Conrad Roe, 25 Cherry Tree Avenue, Walsall WS5 4LH. Please include sae. Meetings twice monthly.

ZX Guaranteed: G A Bobker, 29 Chadderton Drive, Unsworthy, Bury, Lancashire. Exchanges information and programs throughout the country.

ZX-80/ZX-81 Users' Club: PO Box 159, Kingston-on-Thames. A postal club.

Overseas

Belgium: ASBL BDMA Belgium National Sinclair Club; P Glenisson, Rue De l'Epeestraat, 14, 1200 Bruxelles.

Belgium, France and Luxembourg: Club Sinclair, Raymong Betz, 38 Chemin du Moulin 38, B-1328 Ohain, Belgium (322 6537468).
Belgian User Group for Sinclair owners (BUGS); Op de Beeck, Patrick, Drabstraat 144, 2510 Mortsel.
Micro-Europe Club; R Betz, Chemin du Moulin, B1328, Ohain, Belgium. Telephone: CCP 000 0846556–37.

Denmark: Danmarks National ZX-8081 Klub (DNZK), Jens Larson, Skovmosevej 6.4200 Slagelese, post giro 1 46 24 66.
ZZ-Brugergruppen i Danmark, Boks 44, 2650 Hvidovre, Gratis medlemskab og gratis blad til enhver interesseret.
J Niels-Erik Hartmann, OZ-ZX-Radioamator, Bruger Gruppe, Bredgade 25 DK-4900, Nakskov.

East Netherlands: Jonathon Meyer, Van Spaen Straat 22,6524 H.N. Nijmegen; (080 223411).

Germany: ZX-80 Club, a postal club; contact Thomas Jencyzyk. Hameln, Postfach 65 D-3250 Hameln, Germany.

Indonesia: Jakarta ZX-80/81 Users' Club, J S Wijaya, PO Box 20, Jkukg, Jakarta, Utara, Indonesia.

Irish Amateur Computer Club: Martin Stapleton, 48 Seacourt, Clontarf, Dublin 3. (331304).

Italy: Sinclair Club, Vie Molimo Vecchio so/F, 40026 Imola, Italy.
Genova Sinclair Club; Vittorio Gioia, Via F Corridoni, 2-1, telephone 010 3125 51.

Micro-Europe: Belgium or Club Paris-Micro, 19 Rue de Tilly, 92700, Colombes, France; associated with Club Micro-Europe.

Republic of Ireland: Irish ZX-8081 Users' Club, 73 Cnoc Crionain, Baile Atha, Cliath 1.

Singapore: Sinclair Users' Group: Eric Mortimer, 1D Wilmer Court, Leonie Hill Road, Singapore.

South Africa: Johannesburg ZX-80–81 Computer Users' Club: S Lucas, c/o Hoechst SA (Pty) Ltd, PO Box 8692, Johannesburg.
Johannesburg ZX Users' Club: Lennert E R Fisher, PO Box 61446, Marshallstown, Johannesburg.

Spain: Club Nacional de Usuarios del ZX-81, Joseph-Oriol Tomas, Avda. de Madrid, No 203 207, 10, 3a esc. A Barcelona-14 Espana. International ZX Spectrum Club: Gabriel Indalecio Cano, Sardana, 4 atrico 2a, San Andres de la Barca, Barcelona. Send international reply coupon. Produces a bi-monthly magazine. Spanish ZX Micro Club: Apartado 181, Alicante (Costa Blanca), Spain.
ZX Club Spain; C Benito PO Box 3253, Madrid, Spain.

Swedish ZX-club: Sinclair Datorklubben, Box 1007, S–122, 22 Enskede, Sweden.

United States: Bay Area ZX-80 User Group, 2660 Las Aromas, Oakland CA94611.—Harvard Group, Bolton Road, Harvard MA 01451: (617 456 3967).

Put everything you need on the keyboard with a Custom Keypanel Kit.

At last! An end to keyboard fumble.

A must for all multikey games and a revolution for flight simulation, VU-CALC, VU-FILE and other sophisticated software.

Instantly changeable precision die-cut panels fit over your Spectrum keyboard.

Each kit comes in a clear plastic wallet and contains: 10 matt black Keypanels plus a sheet containing over 140 bright red self adhesive command labels, pre-printed with words and symbols – arrows, left, right, FIRE!, POWER!, etc, plus a sheet of blanks for your own designs.

The FIRST add-on for your Spectrum.

...and now Keypanel Kits for the ORIC

We despatch to you first class post by return.

Post today to **Softeach Limited**, 25 College Road, Reading, Berkshire, RG6 1QE.

Please send me:

..... Spectrum Keypanel Kits at £3.95 + 35p p&p each (overseas should add 25% for additional surface mail)

..... ORIC Keypanel Kits at £4.95 + 35p p&p each (overseas should add 25% for additiona! surface mail)

I enclose a total remittance of £..... cheques/postal orders payable to **Softeach Limited**.

NAME .....

ADDRESS .....

.....

SU O

PROGRAMS WANTED

SPECTRUM DRAGON
BBC ZX81

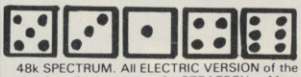
WORK FORCE

THE BIGGEST LITTLE SOFTWARE HOUSE AROUND

DO NOT PASS GO

Now the SPECTRUM VERSION IS READY D.N.P.G. is a complete simulation of THAT BOARD GAME you know PARK LANE and all that. Up to SIX PLAYERS can compete with the MICRO doing all the work. Acts as DICE THROWER, BOARD, RENT COLLECTOR, UMPIRE, BANK, RULE BOOK, ACCOUNTANT, ESTATE AGENT and ASSET RECORDER. SUPERB GRAPHICS by GARRY KENNEDY (thanks mate). GAME SAVE with winner so far report. Complete with full instructions. The ULTIMATE in FAMILY GAMES. DON'T MONOPOLISE YOUR MICRO. AMAZE your friends and family. (Can you imagine your GRANNY on a MICRO?). A 16k ZX81 version also available. 48k SPECTRUM or 16k ZX81 versions **ONLY £6.95.**

YAHTZI 48K



48k SPECTRUM. All ELECTRIC VERSION of the classic dice game of STRATEGY. More CHUNKY graphics from GARRY KENNEDY. No extras required up to SIX PLAYERS can compete, or practise if you wish. SPECTRUM acts as UMPIRE, SCORE SHEET and DICE THROWER. Update your games cupboard for just **£5.50.** 48k only.

UP TO 6 PLAYERS **£5.50**

STOP PRESS
MORE SPECTRUM MAGIC

No time for the pictures all ready now!!!!

DOOM BUGS

We vote this game as the best arcade game submitted. REMEMBER that comfortable feeling when "IT ALL FELT RIGHT" and that ANTICIPATION before each NEW GAME. Well IT'S BACK and it really does FEEL GOOD. Trapped in GRUBBER'S LAIR the aim is to escape to the next level by eating your way through the trapdoor whilst being pursued by BUGS. BUBBERGRUBBERS and GRUBBER HIMSELF. GREAT GRAPHICS, AGF JOYSTICK COMPATIBLE, FAST, TWO LEVELS and you are not going to believe how much fun it is. PRO-ARCADERS ONLY £5.50 for 16-48k version. ABSOLUTELY MAGIC!!!

THE WINGED AVENGER

Fast and furious. Two versions of the same game on the SPECTRUM tape,, the original and the NEW VERSION. SOUND, GRAPHICS, SEVEN SKILL LEVELS. Full ARCADE ACTION including THREE WAVES OF ALIENS, HIGH SCORE, REFUELLING, RAPID REPEAT FIRING, SMART BOMBS and LASER SHIELD. P.C.W. "ONE OF THE BEST SINCLAIR GAMES YET". HOME COMP WEEKLY "FOUR STAR WINNER". 16k ZX81 VERSION "PROBABLY THE FASTEST ZX81 GAME". NOTED as EXCELLENT by the INTERNATIONAL BUREAU OF SOFTWARE TEST. 16k ZX81 & 16+48k SPECTRUM VERSIONS AVAILABLE. **NOW £5.00.**

NEW RELEASE
"JAWS REVENGE"
48k SPECTRUM

Disappointed with his box office returns JAWS brings his GORY EATING HABITS to the SPECTRUM in his very own ARCADE GAME. JAWS eats his way through a mixed diet of DIVERS, BOATMAN, JELLYFISH, SWIMMERS and FISH. You control JAWS in this FAST MOVING trail of carnage. Avoid DEPTH CHARGES, EXPLODING JELLYFISH, HARPOONS, ARMED SCUBA DIVERS and EAT everything you can. 5 LIVES, SCRAMBLE type SEA BED, current and HIGH SCORE. ALL MACHINE CODE and FAST, DEMO SCREEN. BONUS LIVES, FASTER GAME FOR 10,000 POINTS. WREAK HAVOCK ON THE HUMAN RACE. "THE BEST GAME YET" ANIMAL RIGHTS MOVEMENT". 16 & 48k SPECTRUM **£5.00.**

TRIPLEX

Our CONTENDER for BEST PROGRAM GRAPHICS of the YEAR. TRIPLEX a 3 part game featuring the BEST GRAPHICS YET!!! MOONSHINE ALLEY, a LOW gravity ASTEROID belt in HIGH RES SPLENDOUR. CAKEWALK a SLICE through a RAINBOW VORTEX. ALIEN ALLEY a fight to the DEATH with the HUNTER KILLER SHIPS. A PRO-ARCADE game with a difference. MORE skill than PACE. STATE OF THE ART GRAPHICS. £5.50 for FREE VIEWING.

MATCALC
16 & 48k SPECTRUM

This is our SPREADSHEET PROGRAM with a difference. This ONE has the option of the standard display or a 64 CHARACTER per LINE display or printout. Ideal for WHAT IF, CASH FLOW PROJECTIONS, and analysing related figures. FORMULA may be MATHEMATICAL or LOGICAL. MENU DRIVEN. SAVE and LOAD to TAPE. FULL instructions and TWO matrices on TAPE with a full explanation of their formation. P.C.W. "MORE FLEXIBLE overall than . . . ". Both the 16k & 48k versions on ONE TAPE. SIMPLY HUNDREDS OF USES. **JUST £7.00.**

"SHIFTY" 48k SPECTRUM

A WORD PROCESSOR FOR THE SPECTRUM. "SHIFTY" was designed to overcome the limitations of the standard SINCLAIR HARDWARE, specifically the PRINTER. Using the STANDARD PRINTER all output over 32 CHARACTERS PER LINE is PRINTED SIDEWAYS allowing pages to be formatted from the printer paper. Any width from 20 to 80 characters per line may be specified. Text can be viewed prior to printing and can be JUSTIFIED to the RIGHT MARGIN. SHIFTY will WORD SEARCH, MOVE PARAGRAPHS, SPLIT PARAGRAPHS, APPEND PARAS, SAVE and LOAD from TAPE, INDENT PARAS and allow standard PHRASES to be STORED and accessed from DATA STATEMENTS using DEFINED KEYS. EDITING is ON SCREEN using 4 way CURSOR MOVE. SHIFTY comes complete with a sample letter and full instructions. Requires ZX printer. **ONLY £7.50.**

PIRATE ISLAND

WANTED ADVENTURE FREAKS. Join forces with THE PIRATE and search the ISLAND for the TREASURE. A FAST RESPONSE program ABSOLUTELY NO RANDOM FEATURES. Can you trust a PIRATE. There's BUT ONE WAY to FIND OUT. FOR £5.50 you get a whole ISLAND full of TREASURE, TRAPS, RED HERRINGS and many hours of FRUSTRATING FUN. A TRADITIONAL ADVENTURE. 48K ONLY.

WORK FORCE GIVE-AWAY

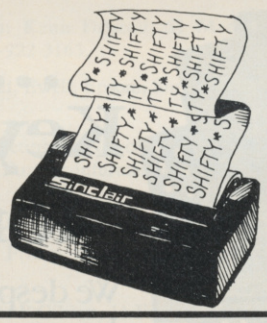
3 WELL REVIEWED MACHINE CODE ARCADE GAMES on one tape as a SAMPLER. HIGH NOON and BASE INVADERS were rated as the best versions available and SCRAMBLE even beat the reviewers when they tried it.

BASE INVADERS
THREE SPEEDS the fastest INVADERS. HIGH SCORE and SHIELD AVAILABLE if you CAN'T HANDLE the ACTION.

HIGH NOON
SMOOTHIE GRAPHICS, FAST ACTION and GOOD SOUND. The best COWBOY SHOOT OUT.

SPECTRUM SCRAMBLE
EIGHT DIRECTIONAL MOVEMENT LASERS, BOMBS, ROCKETS, INSTANT RESPONSE, CONTINUOUS SCORING, SOUND, FUEL DUMPS, RED METEORS, DEFENDER CRAFT and HIGH SCORE. Classic arcade action.

Three PRO-ARCADE GAMES worth £13.95, yours for £6.50. LESS THAN HALF PRICE. THE BEST VALUE EVER FOR 16 & 48k SPECTRUM.



DISPLAY

How would you like 273 different USER DEFINED GRAPHICS on a 16k SPECTRUM or a FULL 336 on a 48k. All can be displayed on screen at the SAME TIME. U.D.G's are stored as PAGES and any two pages may be EXCHANGED in MEMORY. FILES may be SAVED or LOADED from TAPE at a USER specified location. TURN a UDG one quarter or half turn. FLIP a UDG over, REVERSE a UDG, EXPAND a quarter UDG into a FULL CHARACTER. MOVE a UDG one PIXEL at a TIME, UP, DOWN, LEFT or RIGHT. FIVE complete TAPE FILES are INCLUDED on tape ONE CONTAINING a 64 CHARACTER DISPLAY. DESIGN GRID for constructing CHARACTERS and SHAPES. FULL INSTRUCTIONS and ANIMATED DEMO SCREEN. **£7.00.** 16 & 48k SPECTRUM.

PROGRAMMERS DREAM

16k or 48k SPECTRUM.

An advanced SPECTRUM TOOLKIT. Comprised of just 1450 BYTES of POSITION INDEPENDENT MACHINE CODE. RENUMBER lines or blocks. Allows START, FINISH, INCREMENT and new START to be defined. BLOCK or line MOVE including RENUMBER to fit available GAP. RENUMBER will renumber ALL GOTO, GOSUB, LIST etc without further action. CHANGE strings (NAMES or CONTENTS. DUMP VARIABLE NAMES and CONTENTS to DISPLAY PROGRAM SIZE with or without VARIABLE SIZE. This package is FAST, CLEAN, PRODUCES ERROR MESSAGES and is WELL DOCUMENTED. S.USER "WORKS LIKE A DREAM" SPECTRUM ONLY **£6.95.**

ZX-81 16K USERS IMPORTANT ANNOUNCEMENT

WORK FORCE now appointed as U.K. distributor for VENTAMATIC SOFTWARE of SPAIN. 6 of the BEST PRO-ARCADE games LAUNCHED NOW!!. SPECTRUM FOLLOWS. "STATE OF THE ART" for PRO-ARCADERS ONLY. Special launch offer each TAPE contains 2 MACHINE CODE MASTERPIECES for JUST £4.50. NO RUBBISH.

DANGER TRACK

RACE a CAR through a maze 30 times larger than screen. Collect 10 FLAGS, BEWARE 5 ATTACKERS, THROW SMOG BOMBS. ON SCREEN RADAR MONITORS WHOLE MAZE. SPECIAL RESOLUTION.

AND

BUMPER THUMPER

PURSUED by the CHASER you have to PUSH the THUMPERS off SCREEN. All BLOCKS are SLIDERS but don't go near the CHASER or you get "YOUR BUMPER THUMPED" GOOD GRAPHICS.

PHANTOMS

PHANTOMS a HAND CRAFTED version of "...MAN" TWO LEVELS of PLAY, THREE MAZES, ENERGY DOTS, POWER PILLS, FRUITS, FOUR GHOSTS, ESCAPE CORRIDORS, and GREAT GRAPHICS. PRO-ARCADERS only NO FUMBLERS.

AND

CASHBOOT

A MANIC BOOT driven relentlessly by MACHINE CODE. LEAP from square to square knocking out FLAGS. BEWARE the BOOT crashing around. One false move and it's "cobblers" for you. SPECIAL GRAPHICS, HIGH SCORE and several screens.

SPACE BATTLE

PURE MAGIC. Complex 3D GRAPHICS. Unlimited galaxy: STARFIGHTERS attack at SPEED in 3D. 3 Keys GIVE 8 directions. 4 to 6 IMAGES per SECOND. 9 to 10 depth PLAINS. The BEST RESOLUTION at THIS SPEED. YOU HAVEN'T SEEN A PROGRAM THIS GOOD.

MOONLANDER

CLASSIC ARCADE GAME only this one's for PROS ONLY. 2 STAGES of RESOLUTION. SELECTABLE LEVELS of GRAVITY. MACHINE CODE gives instant CLOSE UP of LANDING. PRECISE CONTROL AND FINE GRAPHICS. The HARDEST YET. NO BEGINNERS PLEASE.

WORK FORCE

140, WILSDEN AVENUE
LUTON BEDS.

Post Included

Spectrum sales top 500,000

SALES OF the Spectrum have topped the half million mark, according to Sinclair Research.

The sales both by mail order and retail cover the period from April, 1982 to August, 1983. By comparison 400,000 ZX-81s were sold in a similar period between March, 1981 and July, 1982.

Nigel Searle, managing director of Sinclair Research and the Sinclair new products division, said that he was delighted with the sales figures and that Sinclair Research would continue to support the machine with new peripherals to keep Sinclair owners occupied. They include the ZX Interface 1 and Microdrive units, which were finally launched in August.

New peripherals to be launched later this year will include a joystick and a cartridge interface. They will put the Spectrum in line with machines such as the Atari and Vic-20 which both have cartridge facilities.

Metalab gets a new base

SINCLAIR RESEARCH has bought Milton Hall in Cambridge which it plans to convert into the headquarters of its new Metalab project.

The Metalab will be a £2 million facility for high technology research. Sir Clive Sinclair says:

"The spacious landscape of Milton Hall makes a superb environment for the research we will be doing."

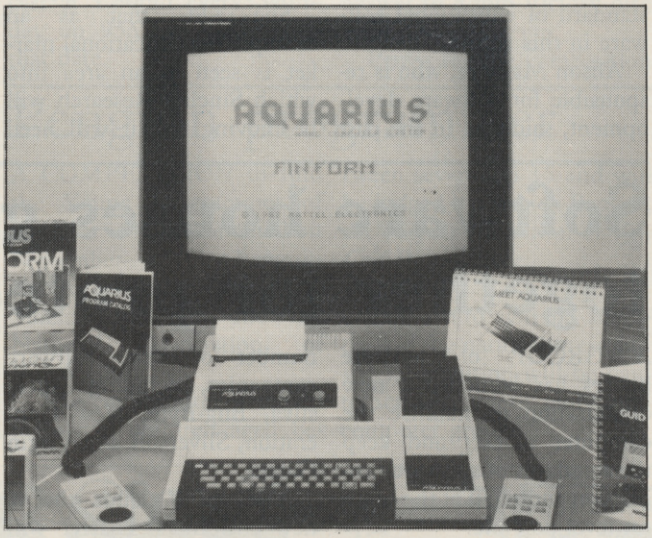
The building has 16,000 sq. ft. of workspace for the Sinclair team of research scientists and will form part of Sinclair Research advanced products division.

Aquarius leads the fall in prices

THE AQUARIUS is the first colour computer to cost less than £80.

The new machine from Mattel, manufacturer of the Intellivision video game system, is aimed at the small computer market which includes such machines as the ZX-81 and Spectrum. Mike Lunch, managing director of Mattel Electronics U.K., says:

"The U.K. has been chosen to spearhead our launch as it is the most sophisticated and fast-developing market. We estimate that by the end of 1983 almost two million households in the U.K. will have a home computer and that sales will be running at the rate of about 750,000 units. That means that the market must be worth more than £100 million annually."



The Aquarius does not match the specifications of the Spectrum in some respects. It has 4K of standard internal RAM which can be upgraded in four 16K units to 52K. The keyboard is similar to that of the Spectrum, although it uses firm plastic keys and not the rubbery ones used by Sinclair.

The central selling point made by Mattel about the machine is that it already has a good deal of software which can be run on it. The peripheral support, such as disc drives and printer, are ready and will be released later this year.

Micronet adaptor adapted

THE LAUNCH of the Micronet adaptor for the Spectrum was delayed once again before its final release in August because of an incompatibility with the new Sinclair Microdrive.

The device was originally to have been launched in May but that deadline could not be met. Since then various launch dates have been quoted, including June 1 and the end of July. Since its press launch potential customers have been put on a waiting list and order forms for the devices are now being despatched.

The incompatibility of the adaptor with the Microdrive was discovered quickly after the launch of the new Sinclair peripheral. Several thousand Micronet adaptors had their ROMs re-programmed so that the Spectrum would accept both devices at the same time.

The major problem was that the Spectrum works on the precedent of one device being the first, or more important, peripheral and that software would be needed to use both devices together.

David Babsky, editor of *Micronet,* says that both devices are now compatible. "I have tried both devices together and they work."

ULA is changed

SINCLAIR RESEARCH has changed the Uncommitted Logic Array on the Spectrum to avoid tuning problems which had dogged some owners who were trying to use some Japanese television sets with their computers.

The problems included a flipping picture, no colour, and no picture. Japanese sets from Hitachi and Toshiba caused difficulties as some have not abided by standards set out by the rest of the industry.

It has been stressed that the changes in the ULA should cause no problems if old software is run on the new machines. It will mean that purchasers of Spectrums will have a wider range of television sets which will be compatible.

Market is now more sophisticated

FOLLOWING the rapid expansion in sales of inexpensive computers, the market has entered a new phase where more sophisticated machines, such as the Spectrum and BBC micro, are in great demand.

That is due largely to the inexpensive products of companies such as Sinclair Research and the prominent marketing of those products by W H Smith, according to a report from Mintel Publications Ltd.

The report shows that in 1982 computer sales increased to 750,000 and this year Mintel predicts that they will reach the one-and-a-quarter million level. In 1983 the market value should be £200 million, plus a further £80 million for add-on peripherals such as disc drives, and software such as games cassettes.

The trend, according to Mintel, has now moved towards the purchasing of more expensive machines such as the Spectrum, BBC micro and Vic-20. At the same time there is a switch from mail order to shops which offer specialist advice on the machines they sell. Those shops include chain stores such as Laskys and Currys.

The 1983 estimates of retailers' share of trade in the computer market puts W H Smith in front with 18 percent. Tandy and Spectrum stores follow with 12 and eight percent respectively. Dixons and Boots are at the bottom of the table, apart from mail order and small outlets which have two percent of the market each.

Mintel predicts that there is still plenty of growth potential but that a shift will take place towards peripherals and software. In 1984 computer owners will be looking to expand their machines.

Sinclair boosts software interest

SINCLAIR RESEARCH has decided to take a more positive role in the development of software. It is concentrating on the educational market first, where the recent deal with Macmillan, the publishers, is seen as an important move to raising the standard of educational software in this sector.

Alison Maguire, who is responsible for software development, said that in the past Sinclair had been reacting only to what was available from other suppliers.

"If something was not available, we did not try to make sure that something was written.

"We wish to act now more like a publisher," she says.

She adds that as an example the educational market is seen as an area into which Sinclair Research will be moving and it will need good software to help the machines realise their potential.

"People will be buying more and more educational software and it is important that it fulfils real educational purposes," she says.

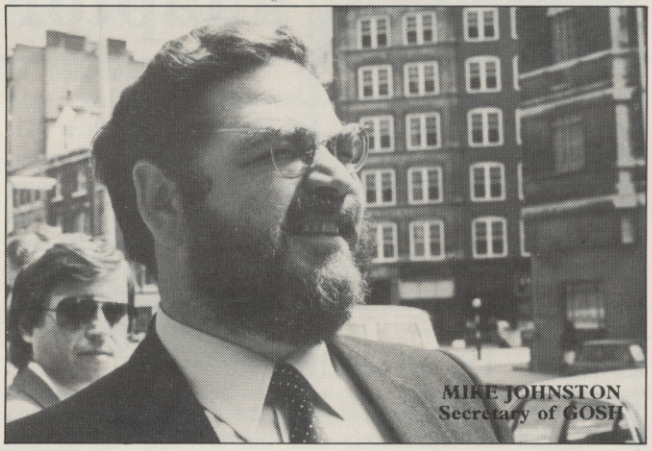
Other areas of the market are also to be considered, such as games and business. Maguire says she is interested in talking to any software house about new projects.

Software houses group together for protection

A GROUP of software houses has launched a new organisation to stabilise the computer market and keep the standards of software production and retail at the highest level possible.

The Guild of Software Houses has been set up by a number of large software companies, including Quicksilva, Bug-Byte, New Generation, Silversoft and Virgin Games.

The guild claims that a new customers' charter will ensure a commitment to maintain promised mail order delivery times, replace defective stock and deal promptly with complaints.



MIKE JOHNSTON
Secretary of GOSH

According to GOSH, not only individual customers will benefit from the new service. A dealer charter for the trade has been drawn up and a code of conduct for software houses in dealing with one another has been arranged.

Any software house found to be in breach of the contracts will be subject to guild disciplinary procedures. Membership of the guild is by annual subscription of £500 but only software houses able to satisfy the committee that they can maintain the guild pledges to dealers and customers will be elected.

The president of GOSH is Nick Alexander, who is also chairman of Virgin Games, and the vice-chairman is Rod Cousens of Quicksilva. All enquiries from software houses wishing to join the guild should be addressed to Mike Johnston, organiser of the ZX Microfairs, who is the secretary of GOSH. He can be reached at 71 Park Lane, London N17 0RG.

SPECTRUM TOP TEN

Program	Last month	Company	Memory
1 Jet Pak	2	Ultimate	48K
2 Scrabble	–	Psion	48K
3 Transylvanian Twr.	5	Shepherd	48K
4 Flight Simulation	3	Psion	48K
5 Horace and the Spiders	–	Mel Hse	16K
6 Ah Diddums	–	Imagine	16K
7 Penetrator	1	Melbourne House	48K
8 Pssst	–	Ultimate	16K
9 Mad Martha	–	Mikro-Gen	48K
10 Horace Goes Skiing	7	Mel Hse/Psion	16K

China visit to promote the ZX-81

BRITISH SINCLAIR-based businessmen have recently visited China to promote the ZX-81. They were part of a group to advise on how to sell computers.

It included Nigel Searle, managing director of Sinclair Research; Richard Hease, chairman of ECC Publications which publishes *Sinclair User;* and Bob Denton, managing director of Prism Microproducts, distributor of Sinclair products and a sister company of ECC.

It is reported that the group hopes to introduce the ZX-81 into China before cheaper lookalikes of the computer become available. This move follows the scare produced by the introduction of a computer called the Peanut, an inexpensive copy of the Apple II.

Contest is broadcast over the radio waves

AUTOMATA, the company which created **Pimania,** has launched another competition with Radio Victory of Southampton in which the questions are broadcast in the form of programs from a Spectrum.

The competition started on June 18 and has been broadcast at 1.30pm every Saturday on 95MHz VHF since that date.

Entrants must pick up the programs either directly from a radio or by using a tape recorder. The program consists of one screen of text with the Radio Victory logo and one line of a famous song beneath it.

Listeners must guess the title of the song and send the answer to Radio Victory disc jockey Dave Carson.

Prizes for the competition are £5 gift tokens but Christian Penfold of Automata hopes that the sponsorship gained from the broadcast will result in bigger prizes.

"The initial prizes were small but we hope that if this takes off we can arrange to give bigger prizes. The response from the first week's competition was amazing. It started as a six-week experiment but because of the response we hope that we can continue it for a long time."

People who live outside the Radio Victory area may still be able to pick up the signals. Radio Victory is boosting the signals to just within the limits set by Independent Broadcasting Authority guidelines. People have heard signals in Brighton and the Isle of Wight.

Penguin programmer

A COMPETITION to find the Young Programmer of the Year is to be launched on September 1 by Penguin Books in conjunction with Sinclair Research and the National Association of Youth Clubs.

The competition is aimed mainly at children aged between seven and 15 and will be judged by Patrick Bossert, the 15-year-old author of *You Can Do the Cube.*

The award will be advertised in the national press and special attention will be paid to schools, youth clubs and computer groups.

The best accessory for your micro

ONLY
£34.49
(P+P £2.50)

The Rotronics Portable Case

Here is the ideal portable work station for home, school or work. Specially made for most home microcomputers, it contains your ZX81, Spectrum, Oric or VIC 20 within a smart executive style case with removable lid for convenience in use.

The individually tailored foam insert securely protects your micro, printer, cassette recorder, tapes and manuals during transit. A scalpel is provided to modify the insert for expansion units and an alternative insert can be supplied if you change your hardware in the future.

All components remain fully operational within the case via interconnections routed between the double layers of foam, so there are no unsightly leads.

This is the first case designed for easy use with each component positioned for convenient operation. The overall dimensions are 138mm x 700mm x 363mm.

Value Corner

ZX Panda

The best 16K RAM for the ZX81.
Anti-wobble design with LED power indicator
16K Expandable RAM Pack £18.50 (p+p 50p)
16K Plug-in Module for above £13.95 (p+p 50p)
32K Giant Panda including Module £31.45 (p+p 75p)

Vixen Ram Cartridge

Maximum flexibility for the VIC 20
Offers standard 16K expansion plus three other switchable memory configurations
£34.45 (p+p 50p)

Order Form

Trade Enquiries Welcome

Please send me (tick appropriate box)

- ☐ Rotronics Portable Case at £36.99 (inc £2.50 p+p) for ZX81/Spectrum/Oric/VIC 20 (Please delete as necessary)
- ☐ ZX Panda 16K RAM Pack at £19.00 (inc. 50p p+p)
- ☐ ZX Panda 16K Plug-in Module at £14.45 (inc. 50p p+p)
- ☐ ZX 32K Giant Panda including Module at £32.20 (inc. 75p p+p)
- ☐ Vixen RAM Cartridge at £34.95 (inc. 50p p+p)

All prices inclusive of VAT
I enclose a cheque/PO for £ _____ made payable to SMT.

Name _____

Address _____

_____

Please allow 14 days for delivery. Send to (no stamp required)
FREEPOST Greens Norton Towcester Northants NN12 8BR

SMT

Technical uses need promoting

TODAY'S low-cost home computer — e.g., the Spectrum — is a sophisticated, powerful machine having the capabilities of the minicomputers of a decade ago which then cost £10,000-£15,000. Those expensive minis were properly used as tools for serious applications. So why is the £130 home computer not similarly used in the same roles?

Unfortunately they have become saddled with the image of toys.

It is clear that the potential serious user of a Spectrum, who is not interested in computing *per se,* is dissuaded from buying the computer, even at £130, to run one program. If it could be demonstrated that there was a library of genuinely useful programs available, low-cost computing would really begin to fulfil its promise.

I wonder whether Sir Clive has perceived this problem? It would be a pity if he rushed into bringing out a new business machine without first doing something to encourage and establish the Spectrum in the area of serious applications.

A start could be made by devoting space at all computer shows to demonstrations of serious software.

Serious application programs are, by their nature, often specialised, and the creation of individuals with expert knowledge of a particular field. Because of that, marketing can be both expensive and difficult — the intended user tends not to be a computer buff and does not buy computer magazines.

In an attempt to allieviate the problem I am preparing a software directory of genuinely useful technical programs available for the Spectrum.

The directory will be titled *Spectrum Technical Software.* If any of your readers would like to participate, they should write to me for a questionnaire.

G A Rooker,
Beamscan,
20 Vaughan Avenue,
London NW4.

Geometric progression

ACCORDING to the Spectrum manual, if a number is substituted for "x" in the program below a circle will be drawn. I have found that with certain numbers substituted for "x" a geometrical figure is drawn repeatedly ending in a high-resolution pattern between two circles. Good numbers to demonstrate it are 525 — which draws a triangle and rotates it — 625 and 4125.

10 PLOT 100,50: DRAW 100,100,x.

R. Wysocki,
Todmorden,
Lancs.

Listing script under fire

AS A NEWCOMER to home computing, having recently acquired a 48K Spectrum, may I say how interesting, informative and really helpful I have found *Sinclair User?*

I do not propose to join the correspondence about wasted space devoted to illustration in your program listing pages but I would like to ask why you find it necessary to publish program listings in what I can only describe as infuriating pseudo-television script. I find listings so printed difficult to read on occasions, though your magazine is certainly better than some I have seen in this respect. Surely it is possible to use a conventional and more easily legible form of type face while retaining the uniform 32 characters per line which Spectrum listings seem to require. Why not keep the television script to the place where it belongs — the television screen?

J H Sharpe,
Godalming,
Surrey.

● *The script we use for the listings is not governed by any aesthetic qualities but by the practicalities of publishing accurate programs. The system we use is to check the program and then list it directly from the machine, thus reducing the possibility of mistakes which can creep in. The alternative would be to have the listings printed which would increase the possibility of errors.*

How valuable are they?

I AM WRITING for assistance with a series of articles to illustrate how microcomputers are playing an increasingly valuable role as a low-cost aid to management.

Can I ask readers to write to me with their experiences of installing a micro at work, be it a ZX-81 or an IBM? What problems they have encountered in software and hardware? Did the salesperson know what they were selling? Did, and was the buyer aware of the limitations of the computer he was being offered? Was the software adequate for the task for which it was bought? If not, what difficulties were encountered?

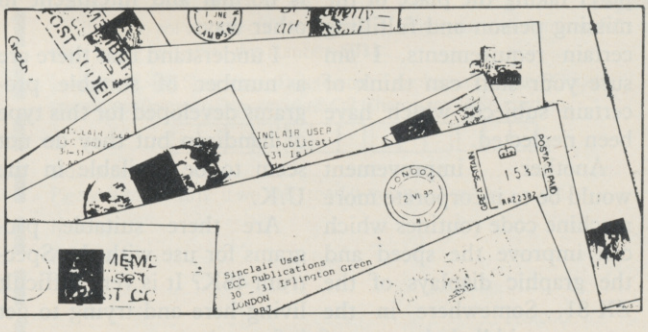
Tom McGowran,
50 Monnow Street,
Monmouth NP5 3XJ.

SU should be in binder

COULD YOU tell me if a binder is available for *Sinclair Users?*

N Taylor,
Bridgend
S. Wales.

● *We are considering making binders available and will keep readers informed.*



Making your ZX-81 organic

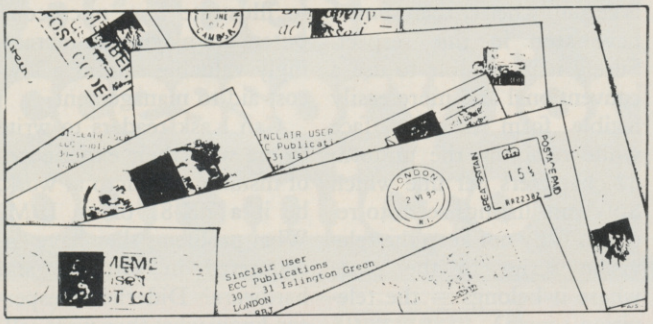
I HAVE found that you can get sound out of a 16K ZX-81 by writing in these lines:

POKE USR 1,1

then press "ENTER" and you will see your screen scattered with squares, so press enter once more and you will see the screen go blank.

If you press keys on the top e.g., 1, 2, 3, low pitches of sound will be heard and if you press Q, A or Z the pitch of the sound will become higher. Therefore the ZX-81 can be used as an organ.

Andrew Mar,
Chorlton-cum-Hardy,
Manchester.



Standards can be improved

HAVING READ articles and typed programs from the two magazines, *Sinclair User* and *Sinclair Programs*, I can safely say that the standard of the two magazines is on the whole extremely high. Occasionally one or two articles and some programs have not been up to the usual standard.

I think the standard could be raised even further by featuring bi-monthly competitions on a certain subject, i.e., a datafile or a computer versus man game — the computer taking the place of the missing person and fulfilling certain requirements. I am sure your staff can think of certain subjects which have been neglected.

Another improvement would be to incorporate more machine code routines which can improve the speed and the graphic displays of the ZX-81. Somewhere in the computer-riddled homes of Britain there must be someone who can supply such routines.

Can anyone supply more two-player games? At the moment the majority of all games — I would say a rough estimate of 78 out of 80 games — cater for a single player.

W M Juned,
Moulton,
Northampton.

● *We are always looking for more complicated games and listings and anyone who has written something like that should send it immediately.*

Aid for deaf requested

I AM retired and British. One of my granddaughters, aged 11, is profoundly deaf—98 percent; she attends a special school and the school and the education authority do not seem to understand the potential of computers in furthering her education. She is normal and intelligent in other ways.

I understand that there are a number of suitable programs developed for this type of handicap but they do not seem to be available in the U.K.

Are there suitable programs for use with the Spectrum 48K? It is very difficult living here and trying to get information.

R Yeats,
Alicante,
Spain.

Useful list of pokes and calls

I HAVE compiled a list of useful pokes and calls to the ROM which all ZX-81 users will find very helpful when programming. They are:

RAND USR 963 — Clears program area

RAND USR 3086 — Scrolls screen

RAND USR 681 — In FAST mode, prevents report code from being displayed at the end of a program

RAND USR 0 — Clears program area and RAMTOP

RAND USR 836 — In FAST mode, loads a program and stops it if it is self-starting

RAND USR 3292 — Equivalent to STOP

POKE 16418,0 — Gives a 24-line screen

POKE 16441,20 — Gives a 34-column screen

POKE 16510,0 — Makes the first line uneditable

POKE 16389,68 — Sets up a minimal display file for 16K users.

Note that the amount of memory the computer has is not important when using these commands.

Richard Wright,
Richmond,
Surrey.

Picking up the points

HERE ARE a few tips I would like to share with other readers. Before playing Jetpac, tape down the "ENTER" key with some adhesive tape. That helps a great deal because it fires continuously and all you have to do is MOVE. In Hungry Horace you can gain a great deal of points by slightly hitting the bell and then moving back. Every time you are under the bell you will hear a "grating" beep. Your score goes up until you move away from the bell.

When Cyber Rats has loaded, you will be asked to enter "2" for a two-player game and "S" to start. If instead you press "CAPS SHIFT" and "BREAK" the program will NEW, together with the USER DEFINED GRAPHICS. Is that a bug in the program?

Farley Thomas,
Egham,
Surrey.

Patterns from E-mode

I HAVE found that on my Spectrum the TRUE VIDEO and the INV. VIDEO commands do not always work. For example, I typed-in a line using INV. VIDEO and closed the brackets and I could not get it back to normal print.

I have found that you can get it into normal print by . . . Getting Extended Mode (E) and press the 7 key on its own, so then after you do that you can get normal print.

You can make patterns using E mode and keys 1, 2, 3, 4, 5, 6, 7, 0.

Sean Simmons (11),
Surrey.

Early retirement for corner man

WHAT HAS happened to the little man on the corner of each page of *Sinclair User?* I have not seen him since the March issue. Is he ill, dead or on holiday? Wherever he is, please bring him back.

Sinclair User is a very good magazine but for two points. First, as many others, I think too much space is wasted on program pages with drawings; second, let us see some decent programs in machine code which permit smooth movement of graphics and the like.

Richard Hardwick,
Chichester,
Sussex.

● *Following the change of layout some months ago we decided that because of lack of space we should give the little man an early retirement, which we felt he deserved after many months of sterling service.*

"YOU REALLY DO LIVE UP TO YOUR BOAST OF SAME DAY DESPATCH"

(W.A. HACKETT, Harborne)

SOFTWARE SUPERMARKET

As more and more Spectrum programs are on sale in more and more places, you really need to ask just one question – WHICH PROGRAMS ARE ACTUALLY WORTH THE MONEY? You can't decide in a crowded shop, or even from a crowded catalogue.

Our catalogue does not have the biggest list of Spectrum programs, just the best. About 50, in fact, covering all fields. (We produce no programs ourselves, so our choice is impartial).

We play all the programs we can find and put just the best of each type into our 24-page catalogue. We quote reviews from *all* the mags and even tell you if your joystick will work!

We choose the best and send them fast. From over 40 countries you praise our same-day despatch. Mail order or phone VISA card orders only please. We're too busy testing programs to run a shop! All goods in stock – and personally tested by us – before a word appears in print!

48K SPECTRUM ONLY

MANIC MINER *"One of the best Spectrum releases this year"* (Pop:Comp:Wkly) *"The graphics and sound are both superb"*. (Pers:Comp:News) Based on the USA arcade chart-topper 'Miner 2049er': great music, superb graphics as you search through 20 screens – each one a different arcade game. Amazing! Demo mode's your best chance to see most screens. JOYSTIX: Kempston. (Bug-Byte) £5.95.

AQUAPLANE From John 'Timegate' Hollis comes a wonderful full-screen arcade game whose sensational graphics are making the competition wonder how he does it! Just water-ski along, avoiding the yachts, motor-boats, rocks, great white sharks etc. Accelerate and watch – it's fantastic! JOYSTIX: Kempston (Quicksilva) £6.95.

JOHNNY REB A new full-screen graphic battle-game. NOT an arcade or adventure game. You fight out a struggle for a river crossing during the American Civil War. 1 or 2 players. Choose your side, equip your army, and fight the battle: great battlefield display. Fight to the death or within time limits as you wish. (Lothlorien) £5.50.

HALLS OF THE THINGS *"Could change the Spectrum games scene overnight . . . technically excellent and dangerously addictive"*. (S. User) Explore a maze, find treasure, avoid nasties . . . BUT this time you can see exactly where you are and the maze scrolls as fast as you can move. Brilliant graphics (try waving your sword about) and 19 command keys! (Crystal) £7.50.

GO TO JAIL *"Has to be seen to be appreciated"* (Pers:Comp:News). The best computer version of the famous game we've ever seen. From 2 to 5 players (including the Spectrum, at last! It's ruthless but honest) Every original feature is faithfully reproduced and the screen display is miraculous. (Automata) £6.00.

GOLF By far the best golfing simulation we've seen. All 18 holes in clear high-res graphics. Watch – and hear – yourself play. See the ball in flight. 1 or 2 players: choice of 15 graphic clubs: the most accurate on-screen direction indicator we've ever seen. Preview of each hole available in 4 or 5 full-screen sections! (CRL) £5.95.

THE HOBBIT *"Superior to any other adventure game available"*. (Yr Comp) *"Takes first place . . . for quality and value for money"*. (S. User) THE Spectrum adventure of 1983. Free 285-page illustrated book with clues: unique real-time adventure: 80 locations, 30 beautiful full-screen pictures: 500-word vocab: 16-page manual: 40K of program to 4 people 18 months to write! (Melbourne) £14.95.

PIMANIA *"The best adventure game we have reviewed"*. (S. User) *This game can damage your brain"*. (Pers:Comp:Games) At press-date, you can still win the £6,000 Golden Sundial by solving this wonderfully witty adventure! Brilliant use of music and graphics really shows off your Spectrum. (Automata) £10.00.

BLACK CRYSTAL *"Excellent graphics adventure"*. (S. User) *"Impressed by its sheer quantity"*. (Home Comp:Wkly) 180K of program loads from 2 cassettes in 6 chapters. Solve each of the 6 stages to defeat the Lords of Chaos. Real-time monster battles: 16 command keys. Illustrated manual. (Carnell) £7.50.

MAZIACS Brand new, very much enhanced version of the classic 'Mazogs' maze chase. Some of the best animated cartoon graphics we've seen and the most amazing on-screen fights! You feel like cheering when you win! Full-screen shows only 1/50th of the maze: 4 skill levels: choose your own keys. (Dk'Tronics) £6.95.

ANY SPECTRUM

PHEENIX BRAND NEW – THE BEST SPECTRUM 'PHOENIX' YET! A full arcade-action 5 screens. 5 skill levels. Choice of 2 character sets. Demo mode. 100% machine-code for smooth animation of the multi-coloured flappers and their hatching eggs. Really does cram 48K quality into 16K. JOYSTIX: Kempston: AGF (Megadodo) £5.50.

3D SPACE WARS Brilliant 3D space battle that's brand-new! Demo mode: good, clear screen display of instruments: cockpit view fills 2/3rds of screen. Long-range scanner is actually legible! Re-fuelling in space is great – just like the RAF, takes real skill. Defeat the 3D SEIDDAB (geddit?). Great space-flight simulation from a company famous for earthflight simulations! JOYSTIX: Kempston: AFG (Hewson) £5.95.

TRANS AM Brand new! The down-to-earth GT Racer version of a flight simulation. Take your Red Racer (full-screen graphics) all over the USA, avoid the deadly Black Turbos and find the Gold Cups. Playing area is 600 times your screen size! Real-time clock: accurate speedo: controlled acceleration, braking, steering: amazing night driver phase! (Ultimate) £5.50.

JET-PAC *"A classic which should rank with Space Invaders and Pacman"*. (Pers:Comp:News) *The graphics are superb"*. (C&VG) The fantastic game that blasted Ultimate to fame. Control your test-pilot spaceman as he builds his rocket, fuels it up, explores galaxies. 1 or 2 players. As good as its rave reviews. JOYSTIX: Kempston: Quickshot. (Ultimate) £5.50.

FROGGY *"The game is superb"* (ZX Comp) *"Unreservedly recommended . . . a stunning display"*. (Home Comp:Wkly) This frogger is leaps ahead of the rest! Loads in 2 parts: instructions and keyboard demo first, then the game – which uses so much memory you even have to unplug your printer! A classic game, in its very best form. JOYSTIX: Kempston: Quickshot (DJL) £5.95.

JUNGLE FEVER Escape down the pygmy death-run. Smashing full-screen animated graphics as you leap crashing waterfalls, swing across deep pits on a passing liana, dodge spiders and poisoned blow-darts. More thrills in 48K than 16K! Great! (A&F) £6.90.

E.T.X. *"Must be at the limit of the Spectrum's capabilities . . . graphics are excellent and animation superb"*. (Home Comp:Wkly) Enchanting adventure: 16 full-screen scenes: 1400 power zones: 4 skill levels. And, in 48K, ETX speakes to you as well! JOYSTIX: Kempston: AGF: Quickshot (Abbes) £5.95.

FREE KEYBOARD OVERLAYS!

If you order from this advertisement comes to £25 or more *(excluding* p&p) we will send you a set of ten of our specially printed keyboard overlays. (If you would like to buy them, they cost £2.50 a set). These overlays will help you get the most from the complex new games – and from your own programs!

CALL 01-789 8546 (24 hours)
CHARGE PROGRAMS TO ANY VISA CARD

To: SOFTWARE SUPERMARKET, 87 Howard's Lane, London, SW15 6NU, England.

If you do not want to cut this magazine, write your order out carefully on plain paper and quote this number: **SU11**

I own a 16K/48K Spectrum. (Delete one). I enclose a cheque/PO made payable to Software Supermarket. OR Charge my VISA card no.

☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

Signature .....

Please write clearly. If we can't read it, you won't get it.

Name .....

Address .....

.....

..... Postcode .....

Phone, if any, in case of query .....

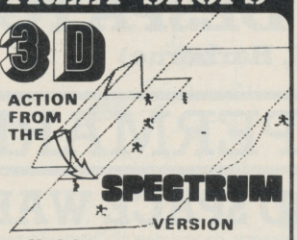
Program Name	Computer	Price
		£
		£
		£
		£
		£
		£
POSTAGE AND PACKING	U.K. Add 55p only per order	£0.55p
	EUROPE. Add 55p for each program	£
	OUTSIDE EUROPE. Add £1 for each - program airmail.	£
	TOTAL	£

NOW IN YOUR HIGH STREET SHOPS

FOOTBALL MANAGER 3D

by Addictive Games

for SPECTRUM 48K AND ZX81 16K



ACTION FROM THE SPECTRUM VERSION

This superb game is **now available** from branches of

W.H. SMITH * and BOOTS.

Manage your own team in this exciting game of skill which vividly captures the drama and excitement of real football.

FEATURES INCLUDE:

★ 4 DIVISIONS ★ F.A. CUP ★ PROMOTION & RELEGATION ★
★ TRANSFER MARKET ★ TEAM SELECTION ★
★ SAVE GAME FACILITY ★★★ *AND MUCH MORE!* ★★★

WHAT THE PRESS SAY ABOUT IT:—

IF YOU have always wanted to manage a football team, FOOTBALL MANAGER, *from Addictive Games, is for you — The game is ideal for a football fanatic but the most interesting thing for us was the 3-D graphics used to create the goalmouth action — the game is a winner.*
SINCLAIR USER FEBRUARY 1983

Although I'm no great football fan, I really enjoyed playing this game — excellent use is made of colour and user-defined graphics. The game is very logically put together, so that the development of strategy and tactics has a real effect. For example, one of my teams got through to the fourth round of the F.A. Cup where it was beaten by a second division side. This upset morale and meant that our promotion bid failed. Perhaps I should have given up the F.A. Cup run and held some good players back — the possibilities are endless. Brian Clough had better watch out!
* SPECTRUM VERSION ONLY. ZX COMPUTING FEB/MARCH 1983

ALSO AVAILABLE FROM THE FOLLOWING SHOPS
BUFFER MICRO SHOP (London)
MICROWARE (Leicester)
ANIROG COMPUTERS (Horley, Surrey)
SUCCESS SERVICES (Walsall)
THE COMPUTER SHOP (Newcastle)
DRAGON BYTE (Leeds)
AND OTHER GOOD COMPUTER SHOPS

PRICES
FOR THE SPECTRUM 48K £6.95, ZX81 16K £5.95
3D GRAPHICS ONLY IN SPECTRUM VERSION
To Order send Cheque P.O. payable to ADDICTIVE GAMES, Dept SU P.O. Box 278 Connilurrow, Milton Keynes MK14 7NE
PLEASE STATE COMPUTER

A MUST FOR ANYONE INTERESTED IN ZX MACHINE CODE!

The finest range of utility programs for ZX Computers. Used by professionals. Very useful for beginners

ZX SPECTRUM MACHINE CODE SYSTEM
(The key to machine code success)

SPECTRUM EDITOR/ASSEMBLER A powerful and essential machine code programming aid.
16K and 48K on same cassette + full documentation.
Major features: EDITOR with Auto line number and renumber, 40 column screen display, tabulated into fields for easy reading, 5 character label names, easy line editing and cursor control; SAVE/LOAD/VERIFY routines, output to ZX PRINTER, TWO PASS ASSEMBLER accepts all Z80 mnemonics, decimal or hex numbers, simple arithmetic on operands; Assembler Directives — ORG, END, DEFB, DEFW, DEFS, DEFL, EQU, DEFM. **ONLY £8.50**

SPECTRUM MONITOR Machine Code Debug/Disassembler
Enter, Run, Debug M/C programs. Compatible with BASIC. Breakpoints and Registers Display. Disassembler to screen or ZX PRINTER. 16K and 48K on one cassette + 30 page manual. **ONLY £7.50**

ZX81 UTILITIES
(For everyone . . . beginner to professional)

ZX81 REMLOAD Machine Code Debug/Monitor
Explore and master machine code. Compatible with BASIC. CREATE A REM line — any length. BREAKPOINTS & REGISTERS DISPLAY. Fully documented 30 page manual and cassette. **ONLY £6.95** 16K to 64K

ZX81 ZX-MC Machine Code Debug/Monitor
The professional one! ENTER/RUN/DEBUG M/C programs. SAVE/LOAD/VERIFY at double speed. BREAKPOINTS & REGISTERS DISPLAY. Self-contained machine code — cannot be used with BASIC. 36 page manual and cassette. **ONLY £7.50** 4K to 64K

ZX81 SCREEN KIT 1 More screen power in your BASIC programs!
BORDERS — any size anywhere on screen. SCROLL in 4 directions. CLEAR and REVERSE part of the screen. FLASHING CURSOR anywhere on screen — simulates INPUT. DATA FILES SAVE/LOAD BASIC variables — Double speed. 880 Bytes machine code for instant response. Becomes part of your BASIC program. **ONLY £5.70** 4K to 64K

SEND CHEQUE/P.O. FOR FAST MAIL ORDER!
S.A.E. for full details.
6 Corkscrew Hill, West Wickham, Kent BR4 9BB
* All prices include VAT & P&P.

PICTURESQUE

Spectrum Software available from: Buffer Micro Streatham, Microware Leicester. Educational suppliers: Griffin & George

WE HAVE SOUND . . . COLOUR . . . ACTION . . . WE HAVE R&R SOFTWARE

Whether you have an Oric, Spectrum or ZX81 you can play golf in the comfort of your home.
ZX81 16K (Not illustrated) All the excitement of the professional circuit. For 1 or 2 players. You can select either 9 or 18 hole course. Try and overcome obstacles such as trees, bunkers, water – even the rough can be tricky! Full on screen instructions. ONLY £3.75
Spectrum Golf 16K Similar to ZX81 Golf but utilizing the Spectrum colour graphics and sound. ONLY £3.75
Oric Golf 48K A Further development of Spectrum Golf utilizing 48K of memory and the Oric graphics. For 1 to 6 players. ONLY £7.95
If golf isn't your game try the other games in our range.

FOR SPECTRUM

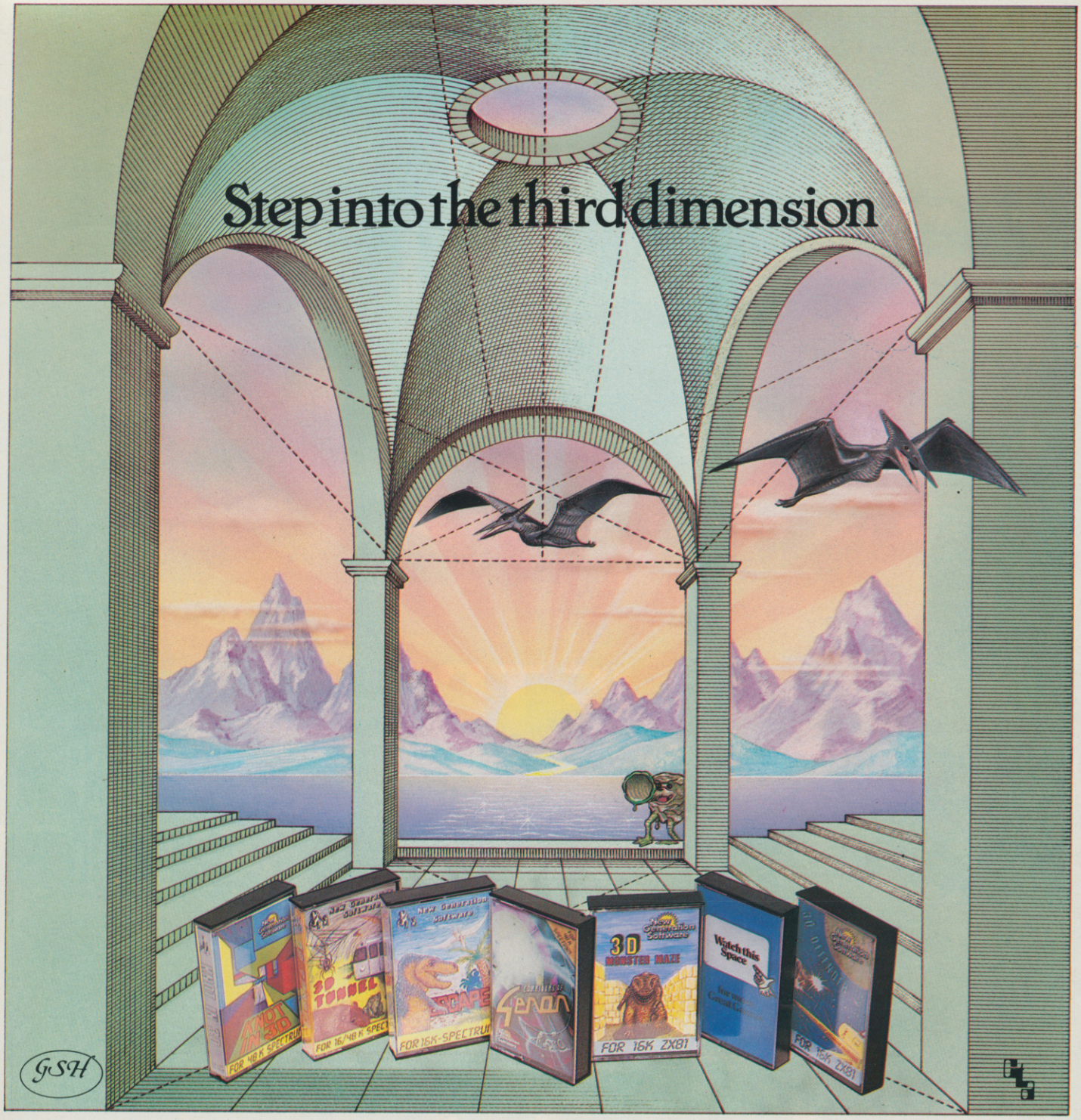
Star Trek 48K See if you can rid the galaxy of the evil Klingons, save the Federation from the treacherous Romulans, race to protect your star-bases from attack. Are you star-ship commander material? ONLY £4.95
Spectipede 16K See how long you can keep the Spectipede at bay as they decend upon you. You'll have the help of poison mushrooms and your gun which both kill the Spectipedes but look out for the spider – he will try to jump on you. For 1 or 2 players. Operates with most leading Joysticks or the Keyboard. ONLY £5.50
Gnasher 16K The ultimate maze game. Eat the dots but look out for the ghosts they could eat you! If you eat an energy pill you can eat the ghost. Full colour graphics and sound. Operates with most leading Joysticks or the Keyboard. £4.95

NEW FOR THE ORIC

Oric Quizzmaster 48K A menu|driven quiz game utilizing sound and colour. Instructions are also given to substitute your own questions and answers. Great fun for all the family and ideal for education i.e. revision.
Quizzmaster 1 – General knowledge, sports and pastimes.
Quizzmaster 2 – General knowledge, rock and pop.
Quizzmaster 3 – Out soon.
ONLY £7.95 each which includes a £2.00 discount voucher for your next Quizzmaster.
Further Quizzmasters to follow.

R&R SOFTWARE
Dept SU 1034 Bourton Road, Tuffley, Gloucester, GL4 0LE
Tel: (0452) 502819

SPECTRUM GOLF available from WHSMITH



Take a giant step closer to reality with New Generation Software. The 3D Graphics of New Generation programs bring the screen alive and makes other games look as flat as snakes and ladders.

Spectrum owners will find that seeing is believing when they open the door on 'THE CORRIDORS OF GENON', the latest creation from New Generation. You will be saving the Universe from the evil that now controls all things. But beware – the sound of footsteps approaching could be Bogul!

Hurtle into a void leaving a trail for your unseen pursuers in 'KNOT IN 3D'. Weave your way through up to five trails but be careful, you could get knotted! Or travel through the depths of a moving tunnel full of bats, rats, spiders and toads in '3D TUNNEL', with a special surprise in the 48K version.

Stamina is the vital ingredient of 'ESCAPE', as you'll be venturing into the maze pursued by walking and flying dinosaurs.

ZX81 owners must be prepared for the shock of coming face to face with the T. Rex that leaps out from '3D MONSTER MAZE'. '3D DEFENDER' takes you out of this world and plunges you into space in a fast moving game to defend your home planet against alien spacecraft in a blitz of explosions, plasma blasts and photon beams.

All these exciting 3D games have been designed by Malcolm Evans, the 3D expert. They'll have you leaping out of your seat because you don't just play New Generation games, you live them.

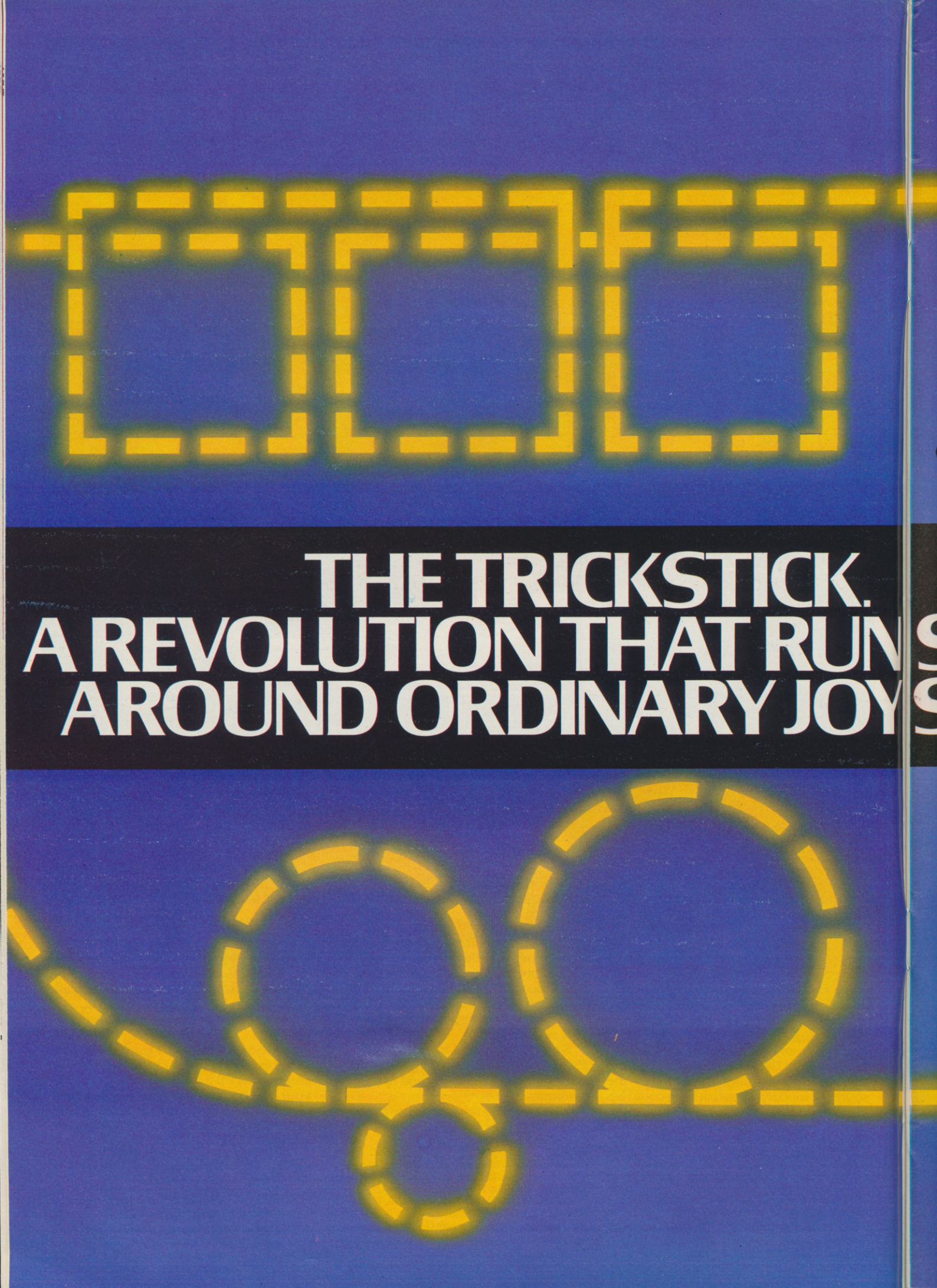
Corridors of Genon for 48K Spectrum £5.95
Knot in 3D for 48K Spectrum £5.95
'The most outstanding thing you'll see for a long time' Popular Computing Weekly
3D Tunnel for 16K/48K Spectrum £5.95
'A masterpiece of programming' Computer and Video Games

Escape for 16K Spectrum £4.95
'One of the best and most original games we have seen for the Spectrum' Sinclair User
3D Monster Maze for 16K ZX81 £4.95
'Brilliant, Brilliant, Brilliant . . .' Popular Computing Weekly
3D Defender for 16K ZX81 £4.95
'Another 3D Winner' Sinclair User

New Generation Software

Available from **W H Smith, Boots, Menzies, Spectrum Group** and all leading computer stores.

FREEPOST Bath BA2 4TD Tel 0225-316924
Mail order by return


THE TRICKSTICK.
A REVOLUTION THAT RUN
AROUND ORDINARY JOY

You know what it's like when there's someone closing in fast and your joystick won't do what your brain wants it to.

It won't let you loop or curve the way you'd like, or arc and spin at the speed you want.

You can't get away quick enough, so what happens? ZAP!

For just £28.00 (+ postage), the Trickstick responds at the speed of light.

With its revolutionary light sensitive controls and own interface, the Trickstick lets you go where you want, at the speed you want.

Not just up and down or side to side, but round and round in any sized curve or loop you need to build up really big scores.

And the Trickstick is easy to use. All you do is pass your thumb or fingers over the controls and your craft responds.

Immediately.

And because the only moving parts are the firing buttons, the new Trickstick will last far longer than old fashioned joysticks.

Best of all, for £28.00 (+ postage), you get a Trickstick, a special training program and a chance to enter The National Trickstick Championships.

Up to eight people can play simultaneously.

For the very first time, you can now play with up to seven of your mates.

With our specially written game, you can either play against the computer, against one friend, in teams of two or three or however you want.

Just by plugging in extra interfaces to each other, up to eight of you can loop the loop and battle it out. All at the same time.

So if you thought computer games were already exciting, wait until you get your hands on a Trickstick.

Revolutionary new software.

Developed especially for use with the Sinclair ZX Spectrum and fully compatible with standard Kempston software, the Trickstick makes your existing software even more fun.

But because it's so revolutionary, it's actually made possible a whole new generation of software.

The first of this new generation is Attaktics, a brand new game which really brings out the full potential of the Trickstick and is available for only £7.50 when you buy your Trickstick.

So fill in the coupon now. And start running rings around your mates before they start running rings around you.

Please send me (state number required):–

[ ] Trickstick/s with training cassette at £28 each £[ ] [ ] Attaktics at £7.50 (with each Trickstick) £[ ] [ ] Attaktics at £10.00 (without Trickstick) £[ ]

Postage 65p. I enclose Cheque/P.O. for £[ ] made payable to East London Robotics Ltd.

My Access [ ] Visa [ ] is [ ]

NAME ADDRESS

Please send to: East London Robotics Ltd., Gate 11, Royal Albert Dock, London E16. 24 Hour information service: 01-471 3308. 24 Hour Access/Visa ordering: 01-474 4715. Special enquiries: 01-474 4430 (Telex: 8813271). Same day despatch to phoned Access or Visa orders.

EAST LONDON ROBOTICS

fantasy

The battle could be yours.....
.....but it won't be easy!

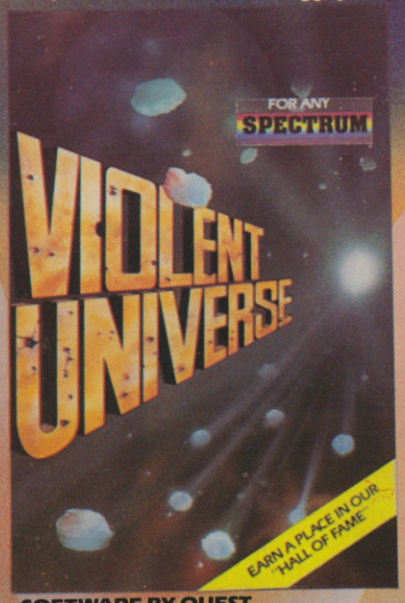
PARTICIPATION – that is the name of OUR game. All our software contains a unique score verification mechanism allowing us to add a new dimension to computer games. Every July and January we will be publishing a ranking list of the top 1000 scorers in each game with the overall top 100 'grand masters' each receiving certificates of merit bearing their position.

September is the last month to qualify for the Black Hole championship. However, from October the sender of the highest valid score each month will win software of their own choice to the value of £50.

The Black Hole is a technicoloured confection of special effects...very demanding; magnificent graphics. (Soft) The explosion effects are some of the best we have seen. ...(Sinc User)

SOFTWARE BY QUEST

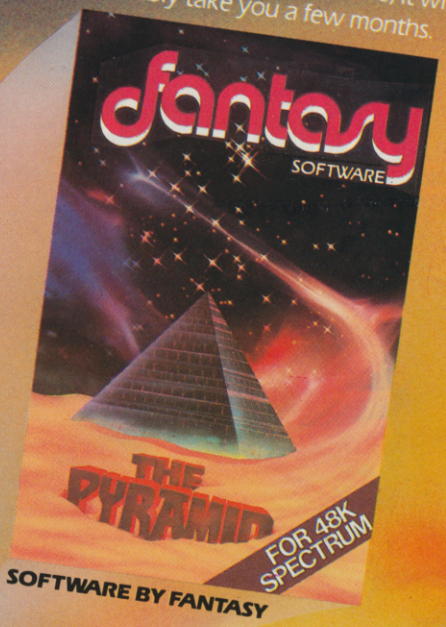
Totally original game plan. Addictive, challenging and offering a complete visual experience with its animated graphics and violent explosive effects. Compatible with ALL leading joysticks.



SOFTWARE BY QUEST

If you are looking for something that will keep you up all night, cause you to pull your hair out, send you mad with its trickery, then you really shouldn't miss this game.

The mystery of "THE PYRAMID" won't take you a few days to solve, it will probably take you a few months.



SOFTWARE BY FANTASY

FANTASY SOFTWARE is available from W.H.Smiths, John Menzies and Computers For All

FANTASY...
...a name to remember

ASK FOR FANTASY SOFTWARE at your local SOFTWARE RETAILER

All games are obtainable at £5.50 each from
FANTASY SOFTWARE, FAUCONBERG LODGE, 27A ST.GEORGES ROAD, CHELTENHAM, GLOS GL50 3DT
despatched by return first class post together with a membership number entitling you to discount on our forthcoming blockbusting software.

Trade Enquiries welcome – telephone 0242-583661

Spectrum receives its biggest improvement

In this special section Stephen Adams reviews the microdrive

THE MICRODRIVE with the Interface 1 module has produced the biggest improvement to the Spectrum yet. It cannot do everything a disc drive can do but it is much cheaper and the interface contains three modules for the price of one.

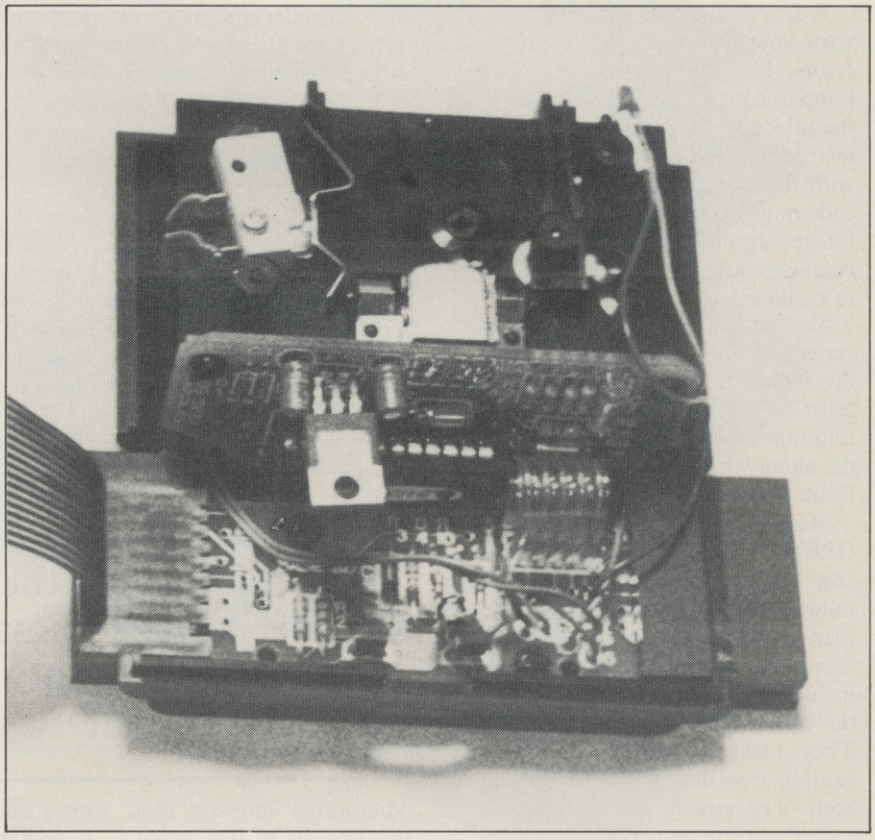
The interface unit controls the Microdrives and RS232 communications/printer interface and a network which allows you to talk to another 63 Spectrum users. The unit fits underneath the Spectrum and an edge connector under its hood pushes on to the back of the Spectrum.

The unit is provided with two screws which replace two of the original screws in the case of the Spectrum to hold it tight and prevent wobble. It also raises the Spectrum 20 degrees to a comfortable typing angle. That system also applies to the Microdrive which has a plastic plate underneath each drive. That can be re-positioned to screw together two adjacent Microdrives underneath the interconnecting socket to strengthen it.

On the back of the unit are three sockets and a duplicate of the expansion connector, so other devices can be plugged in. Another interface by Sinclair called the Interface 2 will plug in there to give access to ROM cartridges and a joystick interface soon. There is a socket on the back of the unit which looks like an Atari joystick interface but do not plug your joystick into it — it is the RS232 interface and you could damage it.

The RS232 interface is a standard way of connecting printers and other devices like modems which use only one wire to pass data across. Each byte is broken into eight binary bits — see the BIN function in the Spectrum manual — and sent down one bit at a time. That method of swapping information is called serial access and is used on all the Interface 1 devices, including the Microdrive.

That involves timing the length of each bit and so the speed of the RS232 can be set to match the speed of the device from which you are sending or receiving data. Speeds up to 19,200 bits per second — the baud rate — can be set easily by POKEing a number into two new system variables listed in the new manual provided with the interface. Those system variables take up another 58 bytes after the ones listed in the original manual.



The RS232 allows you to feed data in and out over the two data lines TX data and RX data but it also has two other control wires to keep an eye on things. They are called DTR and CTS. They are used to tell the Spectrum when information is ready from the device to which it is connected by using the DATA TERMINAL READY (DTR) input. The CLEAR TO SEND (CTS) output does the same but tells the device the Spectrum wants to send data.

> 'It is assumed that if you want to connect an RS232 device you will know how to use it'

None of that appears in the manual and it is assumed that if you want to connect an RS232 device you will know how to use it. Tips are given such as for setting-up the printer to work the Spectrum but they are all about programming. The socket is not a standard socket, so Sinclair will provide a conversion cable at a cost of £14.95 to a full size 25-way 'D' plug.

The RS232 can be sent two types of data, eight-bit binary codes and seven-bit text-only information which omits all control signals and graphics and expands the Basic keywords to full words. The channel is set to "b" or "t" by the FORMAT "t or b"; baud rate command.

The "b" mode usually is used for sending data which controls the RS232 device and therefore should not be

Continued on page 28

continued from page 27

printed. The "t" mode is for all the information which normally would appear on the screen. Programs and data can be sent over the RS232 interface easily using the command LOAD* and SAVE*. Those and other asterisk commands indicate to the Spectrum that the new 8K ROM installed in the interface is required and switches it in to the ROM area.

It also means that you could use it to write your own Basic commands as any errors, like the asterisk after LOAD, jump to a location in RAM which holds the place of the next machine code instruction. By POKEing that number with the location of your own machine code routine, any errors can be checked for new commands and if a program is running could cause the new command to be done.

Sinclair has made Basic the operating system of all the devices connected to the interface and so you will have to learn to use the channels and streams information contained in the new manual along with the various extension to Basic provided by the new ROM.

Streams are OPENed by using OPEN # number of stream (from 4–16); "n" (or "m" or "b" or "t"); followed by a "name" for Microdrive files, a station number for the network or nothing for the RS232. The n stands for network, the m for Microdrive and the b or t as described for the RS232. They make the device available for reading or writing to the device, but not both. The stream acts as a tunnel or passage to the device — or channel — for a particular purpose; more than one stream may be OPENed to a channel and the screen, keyboard and Sinclair printer can also be used this way.

A data file existing on a Microdrive, for instance, can only be read. If you wish to put in more data or change the contents you will have to transfer the whole file from one stream to another, creating a different file and making the changes as you go. Programs, however, must be loaded into memory and then SAVEd back on to the device — if possible — in full, using the entire 48K or 16K of memory; it is not possible to INPUT parts of a program.

The "if possible" occurs because the designer of the program would have to let you return to Basic to SAVE it. Cassette recorders can still be used as normal using SAVE, LOAD and MERGE.

All the devices use RAM to store the data in buffers — 595 bytes for Microdrives and 276 bytes for networks — which take up more RAM. They are allocated space after the system variables so that the start of the Basic program varies depending on how many channels are being used at a time.

OPEN # creates a new buffer and CLOSE # closes the file by writing the whole buffer to the device and then removing the buffer from the memory, freeing the RAM for something else. So using a number of streams means having a smaller program, as up to 595 bytes is needed for each stream. That means that all machine code must be stored above RAMTOP and not in the program —in a REM statement — otherwise the address of the routine will vary depending on what part of the program you are in. Apart from streams the extra commands are MOVE, ERASE, FORMAT and CAT. MOVE transfers a file of information — not a program — from one device to another.

A good example might be a Spectrum on the network wanting to access information on the Microdrive. CAT provides an alphabetical list of files on a Microdrive showing their names and the amount of free space in kilobytes. Files can be protected from CAT by including CHR$(0) as the first letter in the name. As with cassette files there is no foolproof way of protecting anything on a computer.

> 'You will have to learn how to use the channels and streams information in the new manual'

ERASE allows you to clear out the file named on the Microdrive and FORMAT allows you to set up the network, Microdrive or RS232 device so that it can be used. Blank Microdrive cartridges must be FORMATed to give it a name and set a catologue. The network must be given a station number, which can be changed at any time, and the RS232 must be set to the correct speed — only one speed is allowed — as well as indicating whether it is a text ("t") or byte ("b") channel.

INPUT, PRINT, LOAD, SAVE and VERIFY have all been extended to work with streams using an asterisk after the command. MERGE* cannot be used, however, on data file or on any program having saved with a SAVE-*...LINE command, thus providing some software protection in the short term.

The network provides connection for up to 64 Spectrums, via a two-metre-long, two-wire audio lead with 3.5mm. jack plugs on, at 100K baud per second. Anything attached to a stream may use it to transfer programs, data or just INPUT and PRINT statements to one particular station or to broadcast it to every station listening on the network.

INKEY$* may also be used to get individual bytes. The allocation of a station name is spread orally to the various users on the net and more than one station can be allocated the same station number, so you can "listen-in" so long as you know the station number.

The station-to-station contact is by "pooling" and requires a response from the receiving Spectrum before the information is sent. If no reply is received the sending Spectrum will "lock up" and the border will be black. The BREAK key, however, still works.

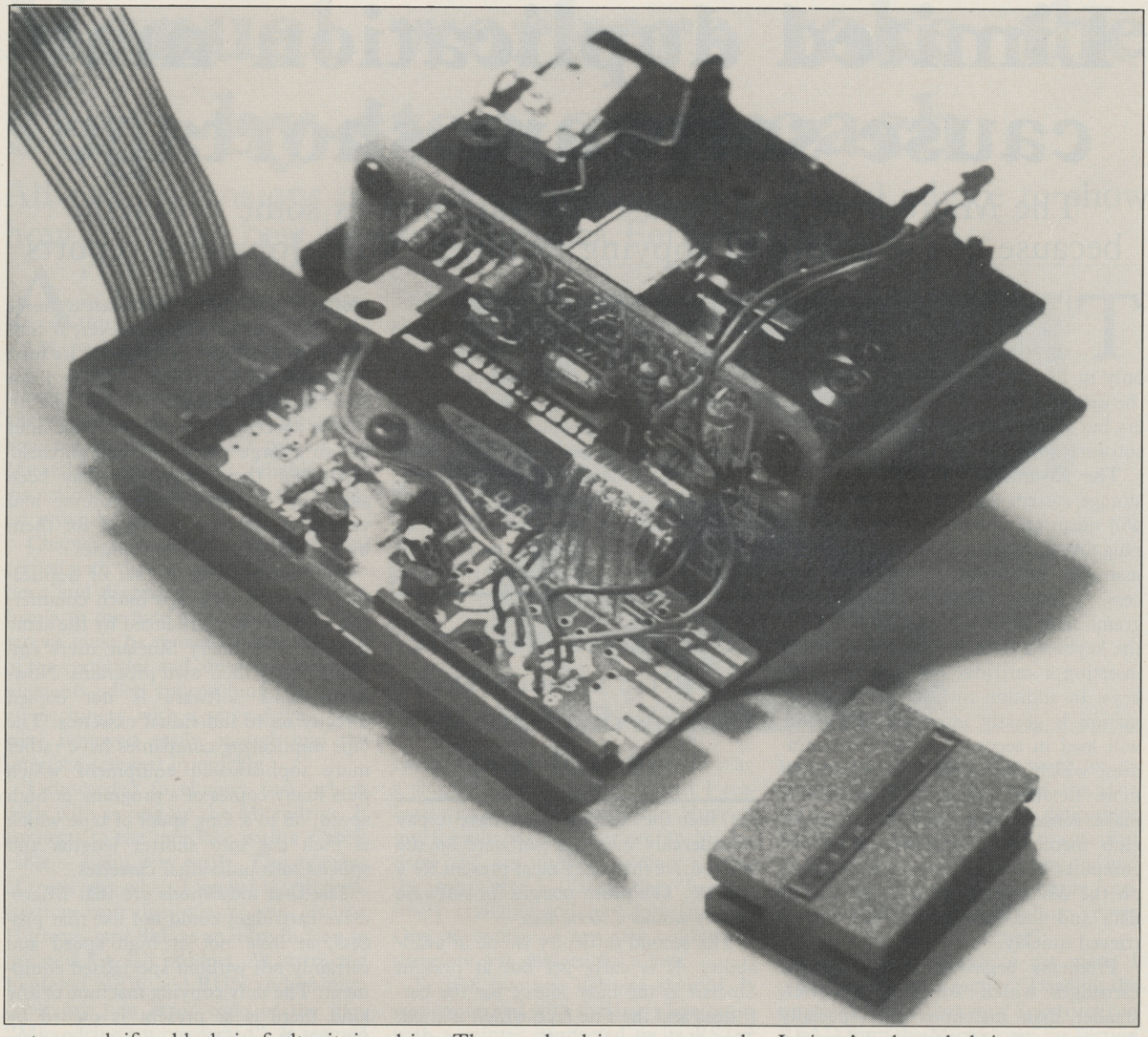
Broadcasting information does not do this as it is sent only once and is then forgotten; no response is required. It has not been possible to test that, apart from seeing demonstrations, as we could obtain only one interface but the demonstration was impressive, as it transferred a screenful of data in three seconds — a rate of 2K per second.

The Microdrive is a very simple device. It has only two moving parts — three if you include the write-protect switch. The motor and a ratchet which stops the motor reversing are the only moving parts. The tape-head is fixed and two springs either side, which bring the tape to the head and not the other way round, eliminate the need for alignment of the head.

It acts like a very fast continuous loop tape recorder running past the head at 30 inches per second — 16 times as fast as the normal cassette recorder. When the drive is running a red warning LED shows at the front of the drive; the cartridge should not be removed while the LED is on.

The tape-head has two tracks and is switched by software at the end of one track to the other, giving a continuous loop of 40 feet of tape track. The tape can be protected by pulling off a tab of plastic with a screwdriver which then means it cannot be over-written.

The tape is made of 1.9mm. wide 23-micron thick video tape, which is slightly thicker than domestic home video tape. Sinclair claims that more than 5,000 operations can be done on the tape before it wears out. The tape format is in blocks of 512 bytes called



sectors and if a block is faulty it is marked so that it is not used.

All cartridges have at least 85K of space but the amount varies depending on the number of sectors damaged by the manufacturing process. With up to eight Microdrives connected to one Spectrum, 860K can be connected at one time.

'The microdrive is a very simple device. It has only two moving parts'

The drives are very reliable and I had no failures at all using the demonstration cartridge supplied. The cassettes are in thick plastic jackets to protect them from dust and they have to be removed to fit them into the Microdrive. The tape-head is not protected, which is surprising. The cartridge cannot be put in the wrong way round and Sinclair provides two labels for each cartridge, one for the top approx $\frac{3}{4}$in. square and a smaller one for the end of the cartridge which can be seen when it is in the drive or its case.

All the equipment tested worked very well and is a remarkable achievement for such a low cost.

There have been no restrictions on hardware add-ons which were not already known and the fact that ROM errors can be intercepted by software will open a new field for software companies. New commands and INPUT protection can be built into any program, machine code or Basic very easily.

'New commands and INPUT protection can be built into any program'

Networking should be very useful for schools. A printer server Basic program is included in the manual. It should also be possible to connect other machines to the net such as the ZX-81 and the Jupiter Ace through their cassette ports.

The RS232 will allow access to printers and modems, as well as allowing you to transfer programs between other computers — such as the BBC — which have an RS232 interface.

The offer is at the moment limited to registered Spectrum users at a cost of £49.95 for each Microdrive, £4.95 for each cartridge and £29.95 for the Interface 1. If you want to buy only the Interface 1 it will cost £49.95 and £4.95 postage on top of that must be included in any order. The Microdrive cannot be used without the Interface 1.

Limited duplication may cause software shortage

The Microdrive could cause software houses some problems because of the dearth of copying facilities. Mike Johnston reports

THE RECENT announcement that the ZX Microdrive will shortly become available, if only in limited supplies, was music to the ears of many patient Spectrum owners but could cause some headaches to software houses.

The advantages of this new mass-storage system are readily apparent. It will mean an end to plugging and unplugging leads, switching tape recorders manually and so on, as the whole process is under software control. Programs may be saved and loaded from the keyboard with no more effort than inserting a cartridge and pressing two keys. In addition the transfer of information is greatly increased. Programs will load in seconds, rather than minutes, which makes the machine much more flexible and useful. At last it makes sense to catalogue books, records, club membership and so on on the computer because the space is available on the Microdrive for a great deal of data and the information can be retrieved quickly.

Problems begin to arise with the cartridges which are mini cassettes, smaller than matchbox size specially designed for the Microdrive. They are a little expensive at £5. Floppy discs, for example, are typically less than half that price and can hold considerably more data. A minimum of 85K may seem a good deal if you graduated recently from a 1K ZX-81 but it is worth remembering that it might be difficult to get two programs the size of The Hobbit on a single cartridge. In practice it is essential to keep back-up copies of important programs and the number of cartridges needed tends to multiply.

The cost may be relatively high because production runs are being kept short until the demand becomes clearer. Alternatively Sinclair may be discouraging sales until stocks can be built up. In either case the price might be expected to fall within a few months. If it does not, then the customers will have to pay considerably more for software on the Microdrive than they do at present for a cassette. The profit margin for software houses would also be less.

> 'Cartridges at £5 are a little expensive. Floppy discs are less than half that'

The second difficulty is one of availability. It is early yet but at present Sinclair is the only source for the cartridges and the fine tape which is used. There has been no indication that they will be made available in bulk to allow software suppliers to sell their own programs on cartridge, although Sinclair may offer to market programs for other companies. Again that problem may be overcome if Microdrives become very popular and cartridges are produced by several manufacturers. It would be a great pity, however, if Sinclair restricted the cartridges to its own programs or a limited selection from other software houses.

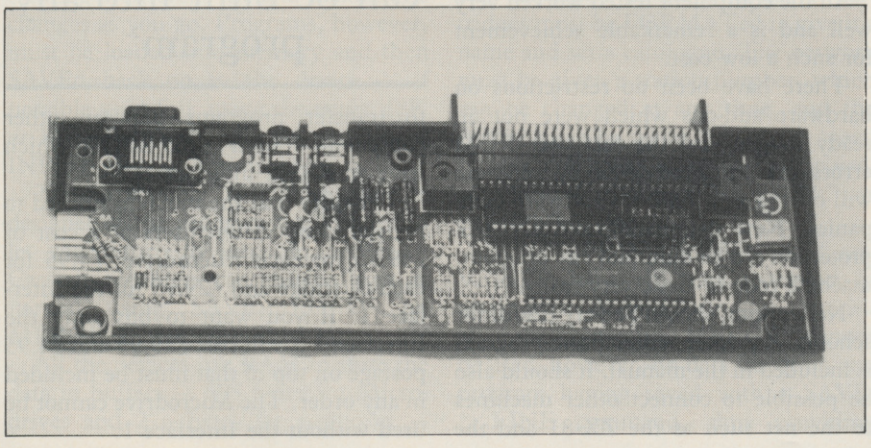
The success of the Sinclair machines lies to a large extent in their intrinsic merit but their popularity has been aided by the very large volume and variety of software produced for them by independent software houses.

Another problem is that of duplication. Not too long ago much commercial software was produced by the same process as ordinary Sinclair users employ to copy their own programs. Nowadays most software is not copied directly on to individual cassettes. The tape duplicating companies have rather more sophisticated equipment which puts many copies of a program, at high speed, on to a long spool of tape which is then cut into shorter lengths and spliced into individual cassettes.

The first indications are that Microdrive cartridges could not use that process, at least not at high speed and certainly not without specialised equipment. The only copying machine of any kind there is at present is owned by Sinclair Research.

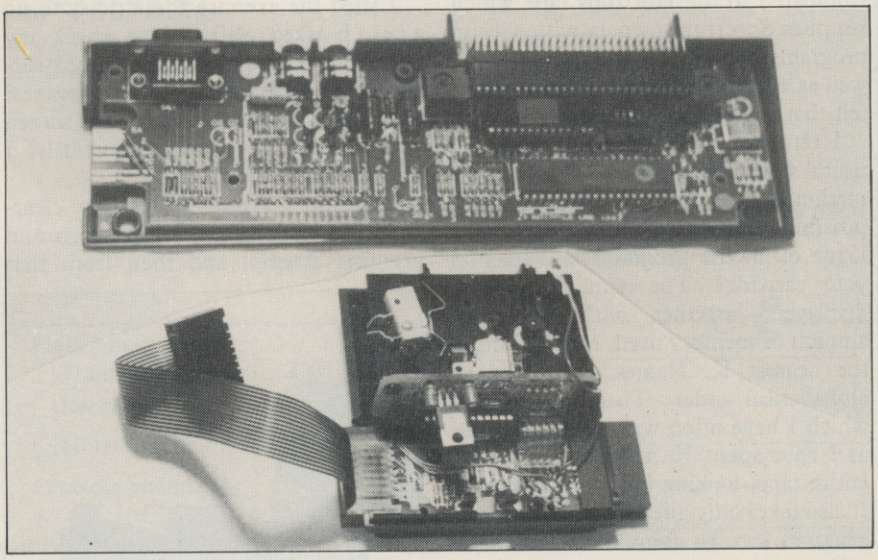
The alternative, and one which many of the smaller companies are likely to take, is to continue to produce software on ordinary cassette tape and allow users to copy the programs on to Microdrive cartridges. Without some means of limiting the number of copies which could be made, however, software companies would find themselves in the same position of vulnerability to piracy they have spent much time and effort trying to avoid.

Those problems are not immediate, as it seems unlikely that there will be a big demand for Microdrive software before the early part of next year, when the devices begin to become generally available. What seems clear is that it is in the long-term interest of all groups, including users, that sufficient technical information is made available to enable good software to be produced for this exciting new development.



Manual workers take the step-by-step approach

All new extensions of home computing need careful advice to show how they can best be used. Rebecca Ferguson reports.



AFTER THE YEAR of publicity I somehow expected something bigger than the chubby, RAM pack-sized Microdrive and the tiny information-holding cartridge which resembles nothing more than an after-dinner mint. Like the Spectrum, however, and unlike the ZX printer, the Microdrive seems firm, reliable, and disinclined to fall to pieces at the slightest provocation.

Chapter one of the manual is concerned with the interface. Clear instructions and diagrams show how to fit it firmly to the base of a Spectrum. Two screws must be removed from the base of the computer and, despite unnerving moments when approaching that piece of machinery with a screwdriver, they were removed easily enough and the interface screwed in quickly.

I proceeded to chapter two, which deals with setting-up the Microdrive. It connects to the interface with a ribbon cable — again very easily. The moment of truth was when I loaded the demonstration cartridge which acts, as the Horizons tape did, as an introduction to this new Sinclair product. As instructed I entered NEW and RUN and encountered my first error code of the day, "Microdrive not connected". It seemed to be but I unplugged everything, started again, and was rewarded with the screen display "Welcome to the ZX Microdrive".

I went on to break into the introductory program to examine the Basic listing. Trying to return from the listing to the program, though, produced another error code, and once again I had to start from the beginning.

Reading about the interface and Microdrive before their launch I gathered that they offered four major advantages — rapid information storage and retrieval, memory extension, the ability to link my Spectrum to one or many others, and the opportunity to link many other pieces of equipment to my computer through the RS232 interface. The demonstration tape elaborated on that information.

Section one gave information about The Net Game. That involves linking two Spectrums for their owners to play a simple game. It was then that I realised that it was impracticable. None of my friends has an interface or Microdrive and are unlikely to have during the next year — until they become freely available and probably cheaper. One advantage of my new equipment therefore was shelved for a year.

Section two was likewise shelved. It was concerned with making a Spectrum with a printer connected to its RS232 interface print-out files for any other Spectrum linked to it. Section three, which deals with the demonstration program, and chapter four, which covered the initial screen display which I had seen, could be looked at quickly, and I moved to the next section, which demonstrated the use of a large file.

> 'I found the information contained in the cartridge to be sketchy. Compared to the Horizons tape, which supplies Spectrum owners with programs and a large amount of information, I found that it was disappointing.'

The program which could be RUN at that point provided an index to the extensions to Basic which are used by the Microdrive. The information was stored on cartridge and I had only to type-in an appropriate keyword for its definition to be called from the data store. I examined several definitions before typing-in a keyword not specified on the index. An error code resulted and attempting to re-load the entire program produced the puzzling report "Microdrive not connected".

Returning at length to the menu I moved to the next section. Loading the program proves that your Spectrum can READ from the Microdrive; the section tests that it can also WRITE to it by SAVEing, VERIFYing and ERASEing the demonstration program. Those three tasks took 35 seconds. The normal yellow/blue, blue/red lines of a recording Spectrum were replaced by flashing yellow and black.

The last section of the demonstration program dealt with errors which might result from the use of a Microdrive. I expected some detailed analysis of report codes and was disappointed to see only two screens of simply-written de-

Continued on page 32

Continued from page 31

scription. Apparently errors in READing affect LOADing time and are known as Soft errors, while mistakes made in WRITEing, due to such things as a mistreated cartridge, are known as Hard errors. Thus I was given names for my mistakes but no suggestions as to how they could be corrected.

In all, I found the information contained in the cartridge to be sketchy. Compared to the Horizons tape which supplies Spectrum owners with several programs and some useful routines, as well as a large amount of information, I felt that it was disappointing.

I returned to the manual, to find a useful fact about this type of information storage. By entering CAT 1 it is possible to bring up on screen a catalogue of all the programs and files on your cartridge. The name of each is displayed, together with the total amount of memory used, rounded-up to the nearest K. Names are stored in alphabetical order. That is a facility which I have often wanted on cassettes as I have spent 10 minutes playing an entire tape, looking for a lost program. It also takes only a few seconds so that a program can be found and LOADed within a minute.

I followed the instructions and succeeded in LOADing a short program on to cartridge and retrieving it. I ERASEd it and SAVEd it once again and then tried with a 5K program of my own which I had recorded previously on cassette. To LOAD it from cassette took 40 seconds. Recording it on the Microdrive took 10 seconds and re-LOADing it only six seconds.

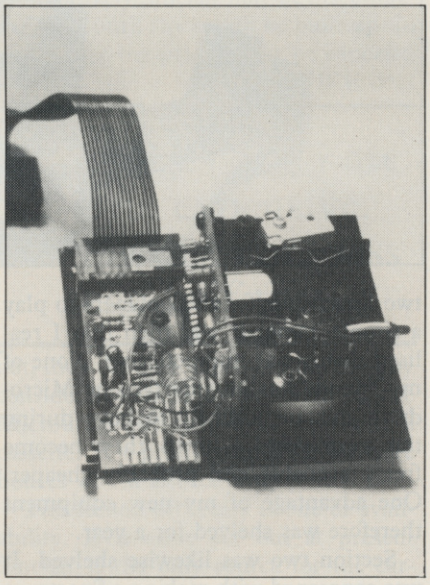
All blank cartridges must be FORMATed before they can be used. That allows you to name them and the computer to identify any areas which cannot be written to or read from. It is also a quick way of deleting all information on a cartridge. Typing CAT at once reveals the memory capacity of the cartridge. The manual claims that capacity never falls below 85K and mine was well above that figure, at 90K.

So far I had found all the information given directly applicable. Chapter five of the manual deals with data, channels and streams, and I was not sure what use I would be able to make of them. The general information at the beginning was clear. To summarise — data can come from and be sent to CHANNELS. They include printers, Microdrives and the keyboard. The routes along it are called STREAMS and the Spectrum has 16 of them, four of which are already in use and 12 which are free.

Information in a cartridge is stored in a file. That must be OPENed before the information is entered and CLOSEd afterwards. The manual gives two short programs for doing it. Open the file, store the numbers 1 to 10 with their squares, close the file, and then RUN another program which prints "The square of is ". The blanks should then be filled with information stored in a file and attached to a specified stream.

I tried the exercise three times to no avail. I asked a friend to check my entries and tried again. I changed sections of it around and produced several error codes at the bottom of the screen which I had never seen previously. I gave up and went to bed.

The next morning things were clearer. I realised that I had made an error on my first attempt and then from that



point, whenever I had opened the file the computer had read faulty information from it instead of writing new information. I deleted the entire file, tried again, and it worked.

A simple error I had made had left me floundering for well over an hour and for the first time I wished that the simple, straightforward manual was more detailed and that it suggested possible errors and how to correct them.

Having managed to enter the example in the book I was inspired to enter my own data and my own program to read from it. Half an hour later the computer printed "1" on screen which was the answer I had been looking for and simultaneously produced another new error code "Invalid Stream Number". As with the previous error code "Microdrive Not Connected", which had appeared periodically the day before, that error code seemed to be unfounded. I decided to move to the next chapter.

The Local Area Network was introduced in chapter seven. It appeared to be very useful. Up to 64 computers can be linked. Programs can be transferred from one to another, meaning that only one person on the network has to type-in a program. It is invaluable for use at user clubs or schools, provided your computers are no more than a yard apart. Useful though it seemed, it was at that time useless because I knew no-one else with an interface.

Chapter eight dealt with connecting equipment to the RS232 interface. I had no equipment to attach and moved on. Sharing a printer among users on a network was similarly passed over, taking me to appendix one — the Net Game specified on the demonstration program. Following appendices give the system variables used, the Microdrive channel, the network, RS232 connections, error codes, and the extension to Basic used.

There seems to be little point in Spectrum owners who use their machines primarily for writing short programs of their own and RUNning professional software buying the Microdrive. The large memory storage available seems to be aimed primarily at skilled programmers and those who are using their Spectrums for business purposes. The fast LOADing and SAVEing is good but will make little significant difference on any but the longest programs.

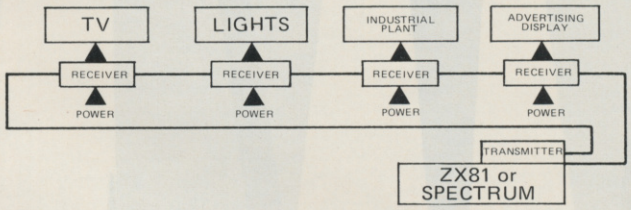
On a professional game the time saved would be appreciable but that would involve the difficult and dubious task of copying copyright material from cassette to cartridge. In any case, the price of almost £100 for Microdrive, interface, postage and packing is too much to spend if all you can do with it is SAVE a few seconds here and there.

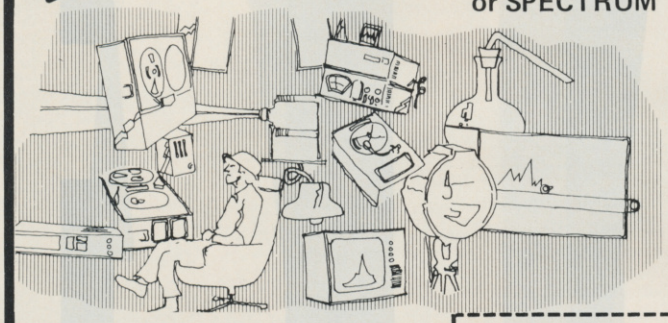
It is better to wait a year until Microdrives are freely available, together with compatible hardware and software. A network of computers opens a wide range of possibilities, allowing programmers to work together, to co-operate and to learn from each other, while avoiding time wasted on typing-in programs LOADing, and SAVEing them.

Software will presumably appear making full use of the Microdrive capabilities. None of that can happen, though, while only a few thousand people scattered across the country have Microdrives. So do not be too despondent if your name is not on the magic Sinclair list. Unless your friend's name, your neighbour's name or the name of someone you can contact is on that list as well, you could save your money.

At last! A useable add-on for your Sinclair

CONTROL MAINS EQUIPMENT
(TV, STEREO, LIGHTS)
DIRECTLY FROM YOUR ZX81
or SPECTRUM





- Up to 8 independent receivers
- Safe and easy to use
- Easy to programme
- 8 bit input port
- Industrial
- Display
- Domestic
- 1.5 Kw capacity
- Low price
- Transmitter £22.95 each
- Receiver £26.95 each

Post & Packing £2.00 per order. All Prices include VAT

By mail order only from:

Ash Micro Services Ltd
93 Hunters Road
Chessington
Surrey KT9 1RY

Please send:
☐ Transmitters ☐ Receivers } for ☐ ZX81 ☐ Spectrum
☐ More information (SAE)
I enclose cheque for
£ _____

Name _____
Address _____

MICRO POWER MICRO POWER MICRO POWER MICRO POWER MICRO POWER MICRO POWER

THE MICRO POWER SPECTRUM 'ADD-ON'

Bring *'JOY'* to your Joysticks!!
Make your beeps *BEEP!!*
Create Multi-Channel Sound Effects!!

BOOM! BLADAM!!

The new Spectrum Add-On gives you:

- ONE Atari/Commodore type Joystick Port
- TWO Potentiometer Joystick Ports
- Amplification of the standard sound output
- THREE-CHANNEL, PROCESSOR INDEPENDENT, PROGRAMMABLE SOUNDS — music, gun-shots, explosions etc
- Demonstration tape and full operating instructions

Note: The 'Add-On' simply plugs straight onto the back of your Spectrum. No soldering required.

Now offered at the incredibly LOW price of **£19.95** incl. VAT (Please add 55p Post & Packing).

JOYSTICKS (Potentiometer-Type)
BUILT £7.45 KIT (incl. case) £5.95

MICRO POWER

NOTE: We stock (and market) PROGRAM POWER SOFTWARE for the BBC, ACORN, SPECTRUM and DRAGON 32. Send S.A.E. for appropriate catalogue.

8/8a REGENT STREET,
CHAPEL ALLERTON,
LEEDS LS7 4PE.
Tel. (0532) 683186 or 696343

BBC, DRAGON & ACORN DEALERS

VISA

POWER MICRO POWER MICRO POWER MICRO POWER MICRO POWER MICRO POWER MICRO

BRIDGE MASTER

An audio course that will teach you to play bridge on your home computer.

"Bridgemaster really does bring the game alive for the beginner... is a far better medium for learning bridge than even the best teach yourself books."... Soft

"A really professional program for a microcomputer... For a learner this offering is ideal... One hundred percent value for money."... Home Computing Weekly

The package, prepared with world expert Terence Reese, contains commentary and computer tapes and a useful reference book – everything you need to learn bridge.

For the Sinclair ZX Spectrum 16/48K – **£24.95.** For the ZX81 16K – **£19.95,** ZX81 1K – **£19.95.**

Available from Boots,* WH Smith* and other leading computer stores or direct from Bridgemaster, FREEPOST, Dept. S3, PO Box 163, Slough SL2 3YY.

*Spectrum version only.
Prices include VAT, post & packing. Cheques & PO's should be made payable to Bridgemaster.

VALH

48K SPECTRUM

ALLA

MOVi SOFT ©

LEGEND

VALHALLA is supplied on a 48K Spectrum program cassette, with VALHALLA player manual and presentation box. As VALHALLA uses the full 48K RAM, microdrives and full-size printers are not supported. ZX printer optional.

VALHALLA is normally available from stock, and orders are despatched by return. If, for any reason we are unable to fulfil your order within 14 days of receipt, we will notify you.

VALHALLA cassettes carry an unconditional lifetime replacement guarantee.

TO ORDER: (UK Orders Only) Simply complete the coupon, and FREEPOST with your cheque/P.O. made payable to LEGEND (UK Mail Order).

Credit Card Orders: By phone 9-5.30 Mon to Fri. stating name and address, Card No. and item(s) required.

RETAILERS: Please contact your regular distributor or LEGEND (Trade Distribution) at the address below.

LEGEND (UK Mail Order) FREEPOST
1 Milton Road, Cambridge CB4 1UY
(0223) 312453

MOVISOFT OPERATING SYSTEM UNDER LICENCE.

Post to:- LEGEND (UK Mail Order) FREEPOST
1 Milton Road, Cambridge CB4 1UY

Please send me.....Copy/copies of VALHALLA for the 48K Spectrum.

I enclose cheque/P.O. for £.....

(£14.95 each incl. VAT and P&P). SU

Or I wish to pay by Access/Barclaycard/Visa

Card No.....

Please print name and address

Name.....

Address.....

.....

.....

Credit Card holder s signature.....

HEWSON CONSULTANTS

You have assumed complete control of your world's last fighter-killer class spacecraft. It is only you who can prevent the ultimate disaster . . . the destruction of your civilisation by the SEIDDAB, an unscrupulous race of murderers, intent on total control of your star system. Locate the enemy fleet on your Radar. Chase the SEIDDAB craft across space against a background of stars. Fire your laser bolts when you have them in your sight. Refuel and go on the offensive again.

The game gets progressively harder. Fleet after fleet of SEIDDAB ships attack. Control your movement with the Spectrum keyboard, AGF joystick or Kempston joystick. Fast machine code action.

For the 16K or 48K Spectrum

only £5.95

More from the HEWSON range

Items from this advertisement *are available through W.H. Smith,* larger branches of Boots and all leading micro computer retailers.

Please rush me

(Tick boxes as required)

- ☐ QUEST ADVENTURE £5.95
- ☐ NIGHTFLITE £5.95
- ☐ HEATHROW A.T.C. £7.95
- ☐ SPECTRAL PANIC £5.95
- ☐ MAZECHASE £4.95
- ☐ SPECVADERS £4.95
- ☐ BACKGAMMON £5.95
- ☐ COUNTRIES OF THE WORLD £5.95
- ☐ DRAGONFLY (For Dragon 32) £6.95
- ☐ 20 BEST PROGRAMS £5.95
- ☐ 40 BEST MACHINE CODE ROUTINES £5.95
- ☐ 3D SPACE-WARS £5.95

NAME _____
Block Capitals please

ADDRESS _____

_____ POSTCODE _____

Post to HEWSON CONSULTANTS 60A St Mary's Street, Wallingford. Oxon. OX10 0EL.

* I ENCLOSE MY REMITTANCE OF _____

* MY CREDIT CARD NUMBER IS _____

* (Delete as appropriate) SIGNED _____

Make cheques/PO's payable to Hewson Consultants Telephone (0491) 36307

URGENT!

We require high quality Spectrum and Dragon software. Good royalties paid. Send your samples today for fast evaluation.

Graphics get poor manual

ONE OF the questions which users of the ZX-81 often ask concerns the use of high-resolution graphics on the ZX-81. A new software-only package has just been produced which will provide eight hi-res commands with a screen grid resolution of 192×256.

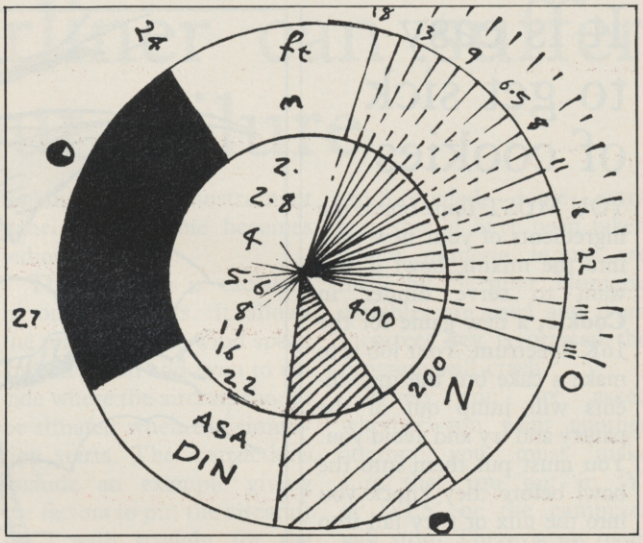
The routines in the package will allow you to draw circles and lines on the screen, as well as defining your own characters. It provides most of the hi-res capabilities of the Spectrum, except for colour.

The program is slow compared to the Spectrum and it can take up to half an hour to draw complicated shapes and patterns. When you have constructed a screenful of graphics you can save the results, to be loaded later.

Like so many packages of its kind, its manual seems to have been written by the programmer. Very often a person who knows a good deal about a program is not the best person to write the manual to explain things to someone who knows nothing of the subject.

The manual is pocket-sized and gives a brief explanation of the hi-res commands available. It does not provide sufficient examples of the commands and half the manual is devoted to blank paper, where the user can make notes. It would have been better if more instructions were included in those spaces.

The 16K ZX-81 high resolution package can be obtained from most computer branches of John Menzies. It costs £5.95.



Photographic memory

SPECIALIST computer applications are difficult to learn about but when such a program is produced it is usually written by experts and is good at doing its job. That is true of **Protim,** a photographic process timer for the 16K ZX-81. A developer can enter the processes and timings necessary for the developing of a photograph. When the data has been set up, option one on the program main menu can be selected to start the timing of a process.

The timer is displayed as a camera with a digital clock set into the centre. The time decreases on the display at approximately five-second intervals. When the time is up a banner saying "process complete" is scrolled on and off the screen until a return to the menu is requested by the user.

There are two disadvantages to the program. The first is in the timing, as the clock can be set using only multiples of five seconds. The other is that the developer will not be able to leave the screen display to do something else.

An application of this kind would have been better applied to a computer which has sound capabilities, such as the Spectrum.

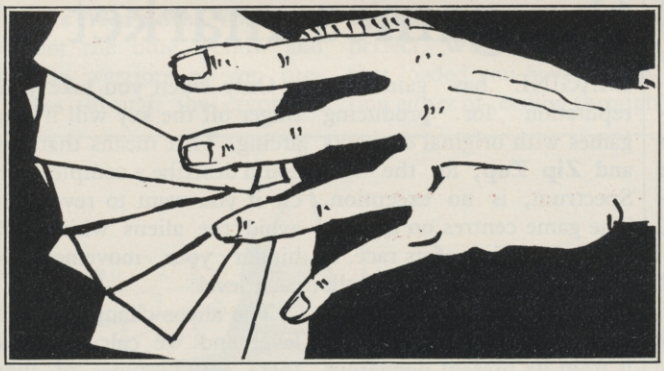
The computer could then inform the user of the end of the process with a buzz or a click.

Apart from those small quibbles the program performs its task well and should be useful to a photographer with a ZX-81.

Protim can be obtained from Photosoft, 32-34 Albert Street, Fleet, Hampshire, GU13 9RL. It costs £5.95.

Perfect machine ruins play

MANUFACTURERS of software, especially those new to the scene, still insist on producing traditional card games. **Eight,** for the 16K ZX-81, is yet another example of the attitude.



The game is usually played by two human opponents. Seven cards are dealt to each player who must pick up and discard cards during the game in an effort to collect, and play, a series of four eights. The winner is the one who manages to find all the eights and the final score is determined by the number of cards left in the loser's hand.

In the ZX-81 game the computer takes the part of your opponent in a series of games. To win a series you must accumulate 100 points or more. The computer plays a good game and we were not able to beat it, although we were very close with two eights in our hand.

In view of the difficulty of beating the machine it would have been a good idea to include several levels of play, if memory space allowed. Unfortunately the computer seems too intelligent.

It is as if the author had set out to prove that the computer could be made to play without human error. What should really be on the programmer's mind is to achieve a balancing effect to give the human some hope of winning. If that is not done, there is no point in playing.

Eights is well-presented but lacks imagination. That is unfortunate as the program is efficient and well-structured. A game, however, does not sell on its code structure.

Eights can be obtained from Hardy Software, 18 Velindre Place, Cardiff, CF4 2AN. It costs £4.

It is easy to get sick of cookies

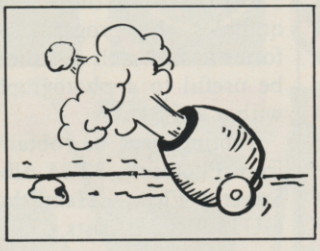
YOU MUST flour-bomb the ingredients of your new cake into the mixing bowl if you want to serve dinner in **Cookie,** a new game for the 16K Spectrum. Your job is to make a cake but the ingredients will jump out of the pantry and try and avoid you. You must put them into the bowl before they knock you into the mix or they fall into the dustbins on either side.

As with all Ultimate products so far, the graphics are of arcade and cartoon quality. The game concept is novel but it is easy to lose interest after you have played through a few levels of those evil ingredients.

When you have been playing the game for a short time you will begin to see that it is easier to play than you first thought. We found that by staying above the mixing bowl we could bomb through several levels of the game before being hit by a pike bone. The game could have been made more difficult at the start so that players do not get used to it so quickly.

Cookie is on first impressions everything that you could ask for in a game. The graphics and sound are superb, the concept is original, and the presentation is professional. The customer will be drawn to it because of those aspects but may feel cheated after two playing sessions.

Cookie costs £5.50 and can be obtained from Ultimate Play the Game, The Green, Asbhy de la Zouch, Leicestershire LE6 5JU.



Limited terror in 3D

MELBOURNE HOUSE has taken its time in releasing **Terror-Daktil 4D** for the 48K Spectrum. The reason may be that the company wanted to produce a program which is up to the standard of The Hobbit but that adventure is a difficult act to follow.

The game displays a three-dimensional landscape over which the terror-daktils fly in their attempts to destroy you. Your cannon and cannonballs are ready but you have to hit the creatures in the body if you are going to score.

The bodies of the birds are difficult to hit when they are in the distance as they look like over-sized space invaders.

The best part of the game is when the birds swoop from formation and dive at you and your thimble-sized cannon.

Once the action starts you will have your hands full with birds swooping from nowhere. We were surprised to discover that you can hit a bird even if your cannon shot is too high in its trajectory. That effect is a mark against the game but is necessary as the cannon will not move very far up or down.

The three-dimensional effects are interesting but at the beginning of the game is a three-dimensional sequence which is unnecessary and tedious to watch.

When you start to play the demonstration mode, which is more than a minute long, it is very dramatic and picturesque but it can become monotonous if you want to get into the game.

Terror-Daktil 4D is available from Melbourne House, 131 Trafalgar Road, London SE10. It costs £6.95.

Imagine zip zaps the games market

IMAGINE has gained a reputation for producing games with original concepts and **Zip Zap,** for the 48K Spectrum, is no exception. The game centres on a robot which is the last of its race. It must collect power cells which are used with a time transporter which will extract it from its present dangerous situation and you into the next level.

It would be an understatement to say that the graphics and sound are superb. Unlike previous Imagine games, Zip Zap has a depth of concept which should keep you playing for hours.

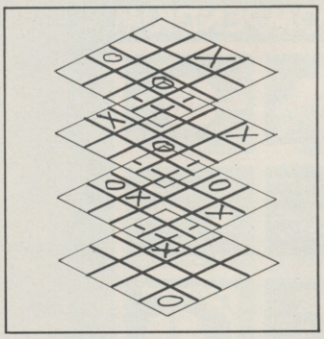
The controls of the robot are difficult to understand at the start, until you realise that the left button will make it arc left and the right key will make it arc right.

Only when you take your finger off the key will it stop arcing. That means that you could describe a complete circle if you want to reverse to avoid the aliens which will hinder your movement at each level.

The aliens change on each level and we calculate that there are 32 types of alien which you must encounter before you return to the first type on level 33.

That means you will have to do plenty of playing to discover all of the alien types and that is what makes the game so compulsive.

Zip Zap is an excellent arcade-quality game. It can be obtained from Imagine Software, Masons Buildings, Exchange Street East, Liverpool L2 3PN. It costs £5.50.



Old game is re-vitalised

NOUGHTS AND CROSSES is better-played on a piece of paper and not with a computer. Artic Computing has realised that and gone one better than the usual three-by-three board in **3D Quadracube** for the 16K Spectrum.

The game has a four-by-four board but it is also has four slices, or levels, on which to play. The slices are displayed in high-resolution during play and as each block is filled by a player's piece it is coloured either blue or red instead of the usual noughts and crosses. That is something you cannot do on paper.

The program gives the option of playing with the Spectrum as a partner or with another human. The computer is difficult to beat as it has a better memory for numbers and can cope better with the extra dimension. Our best score was a thrashing in 17 moves and the worst was another thrashing in seven moves.

3D Quadracube has more of a hold on the player than simple noughts and crosses or connect four. It is an irritating game as you start by knowing that the computer has a better chance of winning than any player. That does not detract from the game, however, as it makes it all the more challenging.

3D Quadracube can be obtained from Artic Computing, 396 James Reckitt Avenue, Hull, N. Humberside HU8 0JA. It costs £4.95.

Basic Airliner can suffer from input failure

A FEW MONTHS ago *Your Computer* published a flight simulation program for the 16K Spectrum. Protek has since taken over the program and released it under the title of **Airliner.**

The program is very good considering it is written mostly in Basic. The display shows all the flight instruments and there is no view through the aircraft windscreen. The only outside view is when you are preparing to land and the level indicator disappears to display a rough 3D representation of the approaching runway.

That effectively means that you are flying blind, and looking at the instrument panel all the time becomes tedious.

The program is excellent in other respects. It allows the pilot to define wind speed and direction and even to decide where the aircraft should be situated when the simulation starts. The instructions include an example giving the factors to put the aircaraft on a path straight for the runway.

It is not simple to put down the aircraft from that position but by using the coordinates you will have some idea of what happens in a crash landing.

While the program is well crash-proofed, some extra care should have been taken where numeric inputs are made by the pilot. Numeric variables are used and if an incorrect key is pressed the program will crash.

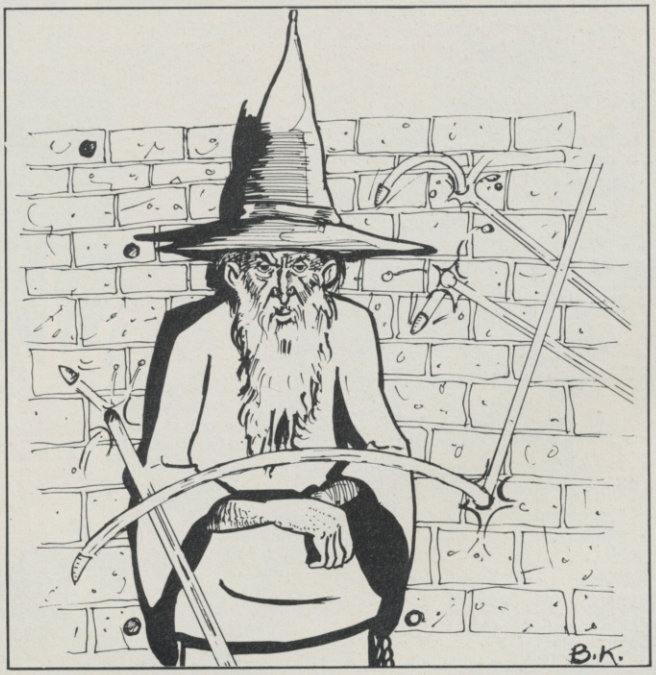
When you are asked whether you want another attempt you must make sure that you put in 'Y' or 'YES' or the computer will stop. There is no room for errors in that department.

Airliner is available from Protek Computing Ltd, Clydesdale Bank Building, High Street, South Queensferry, Edinburgh EH30 9HW. It costs £5.95.

Good idea lacks thought

YOU ARE invited to spend an evening with the evil wizard Cinslair and his many denizens in a new game for the 48K Spectrum, **Wizard's Warriors.** You must shoot the blue, yellow and white warriors as you progress through the crypts of his castle and confront the wizard at the abyss between this world and Hell.

The game sounds fascinating in theory but the Abersoft implementation is less than perfect. When the game is first loaded you have the option either of reading through or skipping the instructions. One press of an incorrect key and you will be left with no idea of the control keys or how to play the game. There are no instructions on the cassette insert, despite the fact that many players often need a crib sheet to refer to if their fingers stray from the correct keys.



The instructions are displayed on three screens before play. That is possible because each screen has been tightly packed with words. It makes comprehension very difficult.

The last page of instructions shows the keyboard configuration. It can be easily missed if you keep your finger on the key too long when changing from one page to the next. The keys have been made too sensitive and the only way to return to the instructions is by re-loading the game.

The Wizard's Warriors costs £4.95 from 7 Maes Afallen, Bow Street, Dyfed SY24 5BA.

JUST AROUND THE CORNER, A NEW

BLACK CRYSTAL

The Classic, six program adventure game for the 48K Spectrum and 16K ZX-81 computers. No software collection is complete without it.

"BLACK CRYSTAL is an excellent graphics adventure and a well thought out package" (Sinclair User, April '83).

"BLACK CRYSTAL has impressed me by its sheer quantity and generally high quality of presentation. I am afraid I have become an addict" (Home Computing Weekly, April '83).

SPECTRUM 48K 180K of program in six parts . . . only £7.50

ZX-81 16K over 100K of program in seven parts . . . only £7.50

Why pay more for less of an adventure?

ZX-81 COMPENDIUM

Alien Intruder, Wumpus Adventure, Numerology, Hangman, Hieroglyphics, Movie Mogul.

The ideal software package for all 16K ZX-81 owners. Six major programmes on two cassettes for only £6.50.

"Alien Intruder/Hieroglyphics — Both programs make good use of graphics and words to make a very entertaining package." (Sinclair User, Aug '82)

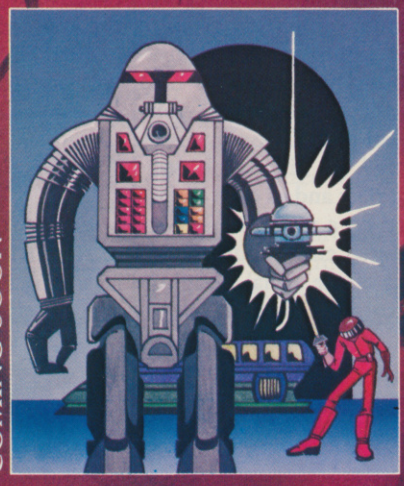
"Alien/Hieroglyphics/Wumpus/Movie — A varied mix from Carnell, all featuring imaginative responses and graphics and all of them good games for all ages (Hieroglyphics is particularly good for children)." (Popular Computing Weekly, Aug '82)

COMING SOON

THE ADVENTURES OF ST. BERNARD

An exciting, fast moving, machine code, arcade game where you guide your intrepid St. Bernard through the perils of the icy wastelands to rescue his Mistress from the clutches of the abominable snowman.

COMING SOON



STARFORCE ONE

Take on the robot guardians of the central computer in a superbly stylised three dimensional battle game.

(100% MACHINE CODE ARCADE ACTION)

COMING SOON

THE CRYPT

written by Stephen Renton

Prepare yourself for the many challenges that shall confront you when you dare to enter "THE CRYPT".

You will battle with giant scorpions, Hell spawn, Craners, Pos-Negs and if you are unlucky enough — the Dark Cyclops in this arcade style adventure.

Available now for the 48K Spectrum @ £4.95

COMING SOON

THE DEVIL RIDES IN

I uttered the last incantations as the clock struck thirteen. All fell silent except for a faint rustling in the corner. From out of the shadows they came, all Hell's fury against me but I was not defenceless until the Angel Of Death, astride a winged horse, joined the battle. Avoiding his bolts of hell fire, I took careful aim. My chances were slim, but if my luck held . . .

(Fast moving, machine code, all action, Arcade game)

V RANGE FROM CARNELL SOFTWARE

COMING SOON

"THE WRATH OF MAGRA"

The first born has been destroyed. The Black Crystal of Beroth has been banished. The alliance of Evil has been defeated by the armies of Lord Fendal. So ends the Third Age. Now we invite you to write your name in the history of the Fourth Age of the Third Continent.

You will meet friends and enemies, old and new, in the long awaited sequel to Volcanic Dungeon. Using high resolution graphics and combining the best qualities of "Black Crystal" and "Volcanic Dungeon", we will allow you to become part of this tale of revenge.

"The Wrath Of Magra" comes as three, 48K programs on cassette, boxed with instruction manual and book detailing the history of the Third Continent and the many spells you will be using throughout the game.

NOTE: "The Wrath Of Magra" is a complete adventure. You need not buy "Volcanic Dungeon" or "Black Crystal" to play it.

Available through most good computer stores or direct from:
Carnell Software Ltd, North Weylands Industrial Estate, Molesey Road, Hersham, Surrey KT12 3PL.
Dealers: Contact us for your nearest wholesaler.

CARNELL SOFTWARE LTD

BUSINESS USERS

SPECTRUM 48K
ACCOUNTS PREPARATION
Produces Prime Entry Listings, Nominal Ledger, Trial Balance, Profit and Loss Account and Balance Sheet with supporting schedules. 73 nominal ledger accounts and automatic VAT calculations.

Sole Trader/Partnership (Up to 4)	£25.00
Limited Company	£25.00
(Combined Price £35.00)	

SALES AND PURCHASE LEDGERS
Produces day book, sales/purchases and VAT analyses, debtors/creditors listings and statements. 250 accounts and 1000 monthly transactions. Automatically calculates VAT. £25.00

ZX-81 16K
ACCOUNTS PREPARATION
31 nominal ledger accounts

Sole Trader	£17.50
Limited Company	£17.50
(Combined Price £25.00)	

SALES AND PURCHASE LEDGERS
Produces day book, sales/purchase and VAT analyses, debtors/creditors listings, statements.
50 accounts and 200 monthly transactions.

Sales	£20.00
Purchases	£20.00
(Combined Price £25.00)	

All programs have been professionally developed and are being used by practising accountants and small businesses. Supplied on cassette with operating instructions.

Full details:

HESTACREST LIMITED
P.O. Box 19, Leighton Buzzard, Beds. LU7 0DG
Tel. 052-523 785.

SPECTRUM FOR YOUNG CHILDREN

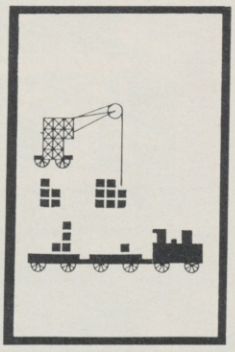
COLOURFUL FUN EDUCATIONAL GAMES FOR 2 to 8 YR OLDS WITH SUPERB GRAPHICS, SOUND AND ANIMATION

SHAPE SORTER 16/48k 5.25
3 animated programmes to aid shape recognition observation and size sorting.

COUNTING 16/48k 5.25
4 grades programmes good as a first introduction to numbers.

ALPHABET 16k or 49k 5.25
Full screen pictures for each letter, with an option to present lower case.

ADDING & SUBTRACTING 16/48k 5.25
3 animated programmes introducing adding and subtracting.



NEW

PATH FINDER 16/48k 5.95
4 Compelling graded games based on mazes to develop planning and forward thinking. A different puzzle every time on each programme. Each of the programmes appeals to children over a wide age range.

WIDGIT SOFTWARE

48 DURHAM ROAD, LONDON N2 9DT
Tapes are available from W. H. Smith and many retail outlets.

J. K. GREYE ENTERPRISES LTD

FOUR STAR
16/48K SPECTRUM

includes games to suit all ages,from 5 to 105

INVASION: Our version of the Classic Arcade Game, surely one of the best around. Includes Full Colour High Res. Graphics, Sound and it's incredibly fast at the end.

KAMIKAZE: If you like Scramble, you'll love this. 16 levels (long ones at that), of tortuously twisting caverns, Missiles, Starmines (which move in between games, so it's never the same next time around), Bases, Fuel Dumps (watch you don't run out of fuel!), and two speeds (difficult and impossible). Definitely a game for those amongst you with a suicidal tendency, when playing games, because you can score even when you crash! (If you can make it past level 8, write and let us know, 'cause that's as far as we've managed!).

MINEFIELD: A totally new game, in which you have to lay mines in a forest. Sounds simple doesn't it? But, once you start, you can't stop and there lies the rub (or to be more exact the explosion!). Guaranteed to get your fingers in a twist!

UFO: Dodge the Asteroids, blast the Alien Craft and work off your aggressive instincts on the keyboard. Gets progressively more difficult the longer you last!

All of these for only £4.95

GAMESTAPE 1
1K ZX81

10 Games incl. ASTEROIDS, UFO, CODE, BOMBER, GUILLOTINE, KALIEDESCOPE, etc.
PROBABLY THE BEST VALUE 1k TAPE AVAILABLE. We've done it 1k, games which some of our competitors require 16k to do!

only **£3.95**

GAMESTAPE 2
16K ZX81

***STARFIGHTER** Superb machine code Space Battle, set against a background of twinkling stars, with stunning explosions - if you can hit the enemy!
PYRAMID Can you move the Pyramid? Make a mistake and it will collapse! A thinkers game.
ARTIST The ultimate Graphic Designers aid. 8 Directions, 10 Memories, SAVE, COPY, RUBOUT, CLS, etc.

only **£3.95**

GAMESTAPE 3
16K ZX81

***CATACOMBS** A Multi-Level Graphics Adventure. Each level can contain up to 9 Rooms, 8 Passages, 7 Monsters, Food, Gold, Traps, Phantoms, an Exit (to the next level), and there's an infinite number of levels.
NOTE ...This is NOT one of the necessarily limited text Adventures as sold elsewhere.
"An excellent addictive game which will keep you amused for hours" ... COMPUTERS & VIDEO GAMES.

only **£4.95**

3D VORTEX
16/48K SPECTRUM

After a successful warp transfer, you drop your craft below light speed, only to discover you are caught in the irresistible gravity well of a giant Neutron Star. You are dragged past the Event Horizon, and then the fun really begins! Gravitic Tidal pressures have created a mind boggling Vortex through the tortured supra-matter of the Neutron Star. And guess who's caught in it? The onboard Navigational Computer copes for a while, but what mere machine can withstand the awesome forces inherent in such an anomaly. Soon the Nav.Com. will cease functioning, and then (of course), it's all down to you.

Are you capable of "seat of the pants" flying, it won't be easy? Not only does the Vortex twist and turn, like some demented worm, but your Tau-Sigma Shield will only withstand 10 contacts with the boundary layer. And, as if that wasn't enough, you have to dodge, or laser, the Octoplasms, Droids and Sirius Class Battlestars, Best of luck! You'll need it!

Features
Stunning 3D Graphics.
Full Sound Effects.
High Speed Machine Code Animation.
Full Instructions.
Choose your own Control Keys.
Compatible with most Joysticks.

only £5.95

If you prefer to see before buying, our range of Gamestapes are stocked by W.H. Smith, John Menzies and good computer stores Nationwide.

TRADE & EXPORT ENQUIRIES WELCOME

SOFTWARE SUCH AS DREAMS ARE MADE OF

Please tick boxes of required tapes:

3D VORTEX	at £5.95	☐
FOUR STAR	at £4.95	☐
GAMESTAPE 1	at £3.95	☐
GAMESTAPE 2	at £3.95	☐
GAMESTAPE 3	at £4.95	☐

All software sold subject to the condition that Hiring, Lending, Unauthorised copying or Resale is Strictly Prohibited

Send your order to:
J.K. GREYE ENTERPRISES LTD.
16 Park St. Bath BA1 2TE

Name .....
Address .....
.....
..... Postcode .....

I enclose a cheque/p.o. for £.....
made payable to **J.K. GREYE ENTERPRISES LTD.**

The dream sellers

CRL brings a whole new world of excitement right into your living room!

Games that test your skills to the ultimate – whether it's zapping down invaders or playing a whole game of cricket.

Only CRL offers such a wide choice of computer programs for the world's most popular micros.

... catch one today at Boots, Laskys, Menzies, selected branches of W. H. Smiths, Spectrum Group and all good computer shops or send direct to CRL.

Never has so much excitement been contained in a cassette!

CRL

140 Whitechapel Road London E1

ZX80/ZX81 and Spectrum Fair

Northern Premier Exhibitions

AT PUDSEY CIVIC CENTRE

on Saturday, 1st. October

DAWSONS CORNER, STANNINGLEY,
NR. LEEDS.
(midway between Leeds & Bradford)

Admission Adults 75p, Children 50p.
10 a.m. till 5.00 p.m.

HARDWARE, SOFTWARE, BOOKS AND MAGAZINES – EVERYTHING FOR ZX USERS

THIS IS A FAIR EXCLUSIVELY FOR ZX COMPUTERS

For tables contact Mike Donnachie 0532-552854
after 4 p.m.

STAR SOCCER

The ACTION game with the thrills of real football
Choose your team formations from 3-2-5, 4-2-4, or -4-4-2.
When the game starts it's up to you to plan your moves and outwit your opponents. See the results played out by fast machine code routines on a birds-eye view of the pitch.

Make the split second decisions that the professionals have to!
Shall I make the short safe pass and maybe let the defence re-group?
Or do I try a long defence-splitting ball and risk an interception?
Has my winger got the speed to take on the full back and beat him?
Do I try a long shot and catch the goalie off his line?
Or shall I give the ball to a team-mate in a better position?
The more games of "Star Soccer" that you play, the more skillful you will become. You'll learn how to set up the goal-scoring opportunities, and how to get yourself out of tight corners. You'll develop your own style of play and find out which formation suits you best.

Side 1 features a SUPER LEAGUE competition between 8 top British sides. Aberdeen, Aston Villa, Celtic, Liverpool, Manchester United, Rangers, Spurs and West Ham. 28 games in all and the League Table is automatically maintained for you.

Side 2 replays the WORLD CUP finals. It's a knock-out competition between England, Scotland, N. Ireland, Italy, West Germany, France, Brazil and Argentina. Lots of excitement with sudden-death extra time in drawn games.

It's amazing how so much is packed into 16K!

Available for ZX Spectrum and ZX81
(Please state which machine when ordering) **ONLY £5.95**

Watson Software Services Ltd. (Dept. B1)
1, Ivy Cottages, Long Road West, Dedham, Essex CO7 6EL

Trade enquiries welcome.

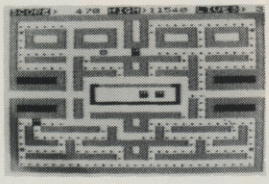
DJL SOFTWARE

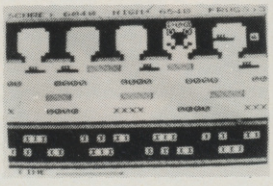
DJL

DEPT SP, 9 TWEED CLOSE, SWINDON, WILTS SN2 3PU

Tel: (0793) 724317 Trade enquiries welcome

Export Orders: **Please add £1.00 per tape airmail**





ZUCKMAN
ZX81 (16K)

- *ALL MACHINE CODE (10K)
- *FOUR INDEPENDENT GHOSTS
- * HIGH-SCORE 'HALL OF FAME'
- *AUTHENTIC ARCADE ACTION
- *TITLE/DISPLAY MODE

ONLY £4.95 INC. P&P

FROGGY
ZX81 (16K)

- *MOVING CARS, LOGS, TURTLES
- *ALLIGATORS, DIVING TURTLES
- *FOUR 'SCREENS' OF ACTION
- *ALL ARCADE FEATURES
- *ENTIRELY MACHINE CODE

ONLY £4.95 INC. P&P

NEW **ZX Spectrum** NEW

FROGGY
16K or 48K

SPECTRUM VERSION OF ARCADE GAME WITH FULL ARCADE FEATURES:

- ★ Fabulous Hi-Res Colour Graphics
- ★ Authentic Sound Effects + 3 Tunes
- ★ 3-D Logs, Swimming & Diving Turtles
- ★ 3 Lanes of Multi-coloured vehicles
- ★ On-screen Score, Hi-Score, Time-bar
- ★ Snake, Alligators and Baby Frog
- ★ 'Top 5' High-Score initials table
- ★ Demonstration Game routine

Your home-sick frog must leap across a busy main road, then onto logs and turtles in the river to reach safety of the river-bank frog-homes. THIS MACHINE-CODE GAME MUST BE SEEN TO BE BELEIVED!!

ONLY £5.95 INC. P & P

HIGH STAKES BIG DOUGH

That's the name of the game with our new range of Strategy Games.

Take Autochef for instance.
You'll have to make every decision possible, from buying food and wines to entering into loan contracts with the ambition of taking over your biggest rival.

How does wheeler dealing in the heart of Texas grab you? In Dallas, you'll need all your wits about you to survive in the oil business and maybe even take over the Euing Empire.

Fly high with Airline and really get the business off the ground – that is if you can handle the costing problems, strikes, cancelled flights, hijacks and aircraft crashes.

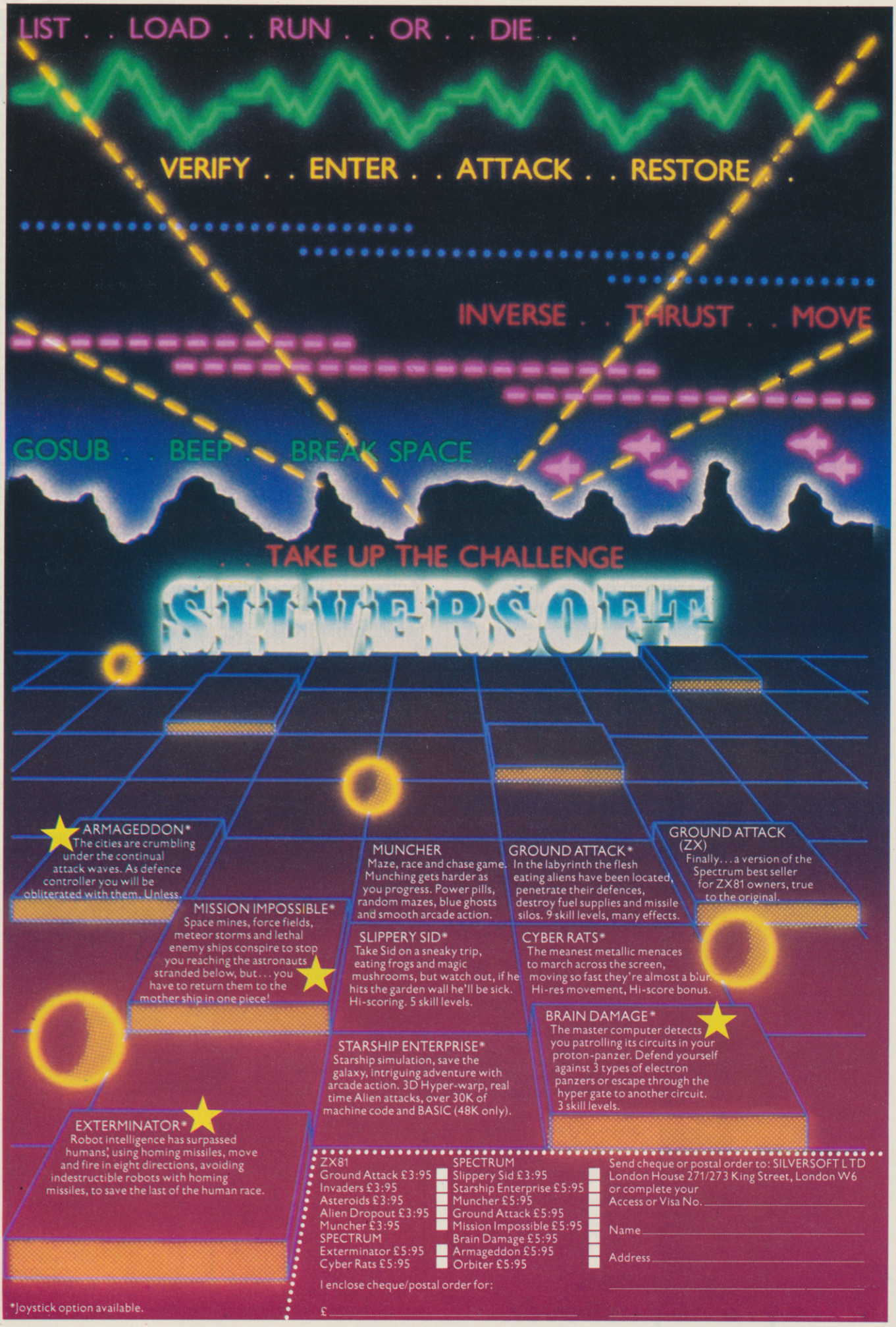
If you'd rather keep your feet firmly on the ground, run a wheat farm with Corn Cropper. There are many decisions to be made on machinery and labour costs, when to plant, irrigate, fertilize and harvest.
Print Shop offers you all the problems of a thriving printing business – from staffing to buying stock and making quotations.

Whatever your taste – whatever your skills, we've got a challenge for you!

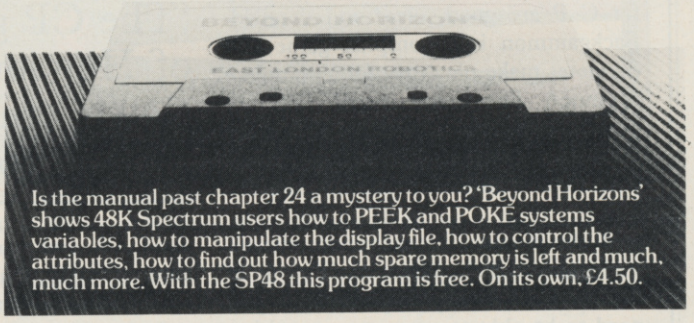
Autochef, Dallas, Airline, Corn Cropper and Print Shop. ZX81 and Spectrum 16K £5 each
Spectrum 48K £6 each

Available from W H Smith, Boots, Rumbelows and all good computer shops or Cases Computer Simulations Ltd., 14 Langton Way, London SE3 7TL.

CCS Strategy Games.
They're no pushover.


LIST . . LOAD . . RUN . . OR . . DIE . .
VERIFY . . ENTER . . ATTACK . . RESTORE . .
INVERSE . . THRUST . . MOVE
GOSUB . . BEEP . . BREAK SPACE . .
. . TAKE UP THE CHALLENGE
SILVERSOFT
ARMAGEDDON*
The cities are crumbling under the continual attack waves. As defence controller you will be obliterated with them. Unless.
MISSION IMPOSSIBLE*
Space mines, force fields, meteor storms and lethal enemy ships conspire to stop you reaching the astronauts stranded below, but... you have to return them to the mother ship in one piece!
EXTERMINATOR*
Robot intelligence has surpassed humans, using homing missiles, move and fire in eight directions, avoiding indestructible robots with homing missiles, to save the last of the human race.
MUNCHER
Maze, race and chase game. Munching gets harder as you progress. Power pills, random mazes, blue ghosts and smooth arcade action.
SLIPPERY SID*
Take Sid on a sneaky trip, eating frogs and magic mushrooms, but watch out, if he hits the garden wall he'll be sick. Hi-scoring. 5 skill levels.
STARSHIP ENTERPRISE*
Starship simulation, save the galaxy, intriguing adventure with arcade action. 3D Hyper-warp, real time Alien attacks, over 30K of machine code and BASIC (48K only).
GROUND ATTACK*
In the labyrinth the flesh eating aliens have been located, penetrate their defences, destroy fuel supplies and missile silos. 9 skill levels, many effects.
CYBER RATS*
The meanest metallic menaces to march across the screen, moving so fast they're almost a blur. Hi-res movement, Hi-score bonus.
BRAIN DAMAGE*
The master computer detects you patrolling its circuits in your proton-panzer. Defend yourself against 3 types of electron panzers or escape through the hyper gate to another circuit. 3 skill levels.
GROUND ATTACK (ZX)
Finally... a version of the Spectrum best seller for ZX81 owners, true to the original.
*Joystick option available.
ZX81
Ground Attack £3:95
Invaders £3:95
Asteroids £3:95
Alien Dropout £3:95
Muncher £3:95
SPECTRUM
Exterminator £5:95
Cyber Rats £5:95
SPECTRUM
Slippery Sid £3:95
Starship Enterprise £5:95
Muncher £5:95
Ground Attack £5:95
Mission Impossible £5:95
Brain Damage £5:95
Armageddon £5:95
Orbiter £5:95
I enclose cheque/postal order for:
£
Send cheque or postal order to: SILVERSOFT LTD
London House 271/273 King Street, London W6
or complete your
Access or Visa No.
Name
Address

Extend your 16k Spectrum to 48k for just £23·00. And get a Free program worth £4·50 into the bargain.



Is the manual past chapter 24 a mystery to you? 'Beyond Horizons' shows 48K Spectrum users how to PEEK and POKE systems variables, how to manipulate the display file, how to control the attributes, how to find out how much spare memory is left and much, much more. With the SP48 this program is free. On its own, £4.50.

SP48, 32K Memory Extension with Program — £23.00

Now, our SP48 offers even better value.

Because now, we're not only offering you the facility to up-grade your 16K Spectrum to 48K, we're also offering you the opportunity to be able to utilise this vastly extended memory quickly and easily.

For £23 all you need to do is plug the chip-set into the sockets provided by Sinclair on your issue 2 (or £35 for issue 1) and you have a standard 48K Spectrum fully compatible with all Sinclair add-ons and very low in power consumption.

There is no soldering required.

Fitting and removal are easy.

And the SP48 carries our full warranty and is upgradable, on a part exchange basis, to SP80.

Then all you need to do is LOAD our specially written 48K guide program, 'Beyond Horizons', and your 48K computer will guide you through its memory.

With no need to labour through manuals.

This will save you time, because we all know how easy it is to get lost with memory maps.

SP80 Paged 64K memory extension — £46

The fitting, power consumption and add-on compatibility are identical to the SP48 (Issue 1 Version £50).

It can be used as a standard 48K, but software instructions can switch to a second page of 32K.

But this is not recommended for the complete beginner.

Yet it is of tremendous benefit to the serious user. And an SP80 FORTH compiler will be available in late September.

For a fit and test service at our premises £3, and by registered post £7.

MAXIMEM ZX81. 32K — £39 (PLUS ONE USED 1K ZX81) 64K — £59 (PLUS ONE USED 1K ZX81)

The MAXIMEM 32 and 64K is a modified ZX81 and not just a RAM pack. It fits inside the case.

We also give a six-month guarantee on the computer, regardless of the age of your trade-in ZX81.

The extra memory uses only a quarter of the power consumption of a 16K plug-in memory, and does not interfere with any standard add-ons, such as printers RS232 or other interfaces.

ZX Slowloader — £10

The ZX Slowloader is a software masterpiece that will help you to LOAD ZX81 programs onto a Spectrum, saving hours of typing time.

The Next Robotics Exclusive. The Trickstick

This new joystick is a revolution in computer games control. With our Trickstick from one to eight players will be able to play simultaneously.

It will be on sale soon — see our next advertisement.

All products on this order form are in stock at the time of going to press. Same day dispatch for phoned Access and Visa orders.

To East London Robotics Ltd: Please send by return (tick items required)

- ☐ MAXIMEM 32K (£39) 64K (£59) + 1kZX81 _____
- ☐ SP48 (Issue 1 £35) (Issue 2 £23) _____
- ☐ SP80 (Issue 1 £50) (Issue 2 £46) _____
- ☐ SLOWLOADER £10 _____
- ☐ "BEYOND HORIZONS" program £4.50 _____
- ☐ Free catalogue (SAE only) _____

Postage 0.65p. I enclose a cheque/PO for _____ My Access/Visa No. is

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Name _____

Address _____

SU/9/83

East London Robotics Ltd., Gate 11, Royal Albert Dock, London E16.
24 Hour Information Service
Tel: 01-471 3308
24 Hour Access and Visa ordering
Tel: 01-474 4715
Special Enquiries: Tel: 01-474 4430
Telex: 8813271

EAST LONDON ROBOTICS

Backgammon has long been a popular game which requires a mixture of luck and skill. John Lambert reports on three versions

Ancient game has varied success on the Spectrum

BACKGAMMON IS AN ancient game involving much more skill than draughts, yet dependent more on luck than chess. It is as old, or possibly older than any of them. The ancient civilisations of China, India and Greece all offer possible birthplaces. There are three versions of the game for the Spectrum by Psion, 16K; Hewson Consultants, 16K; and C P Software, 48K; all priced at £5.95.

Each cassette has instructions for those new to the game. Those written for C P are good, clear and detailed. Backgammon is a complex game and the notes make play easy for a complete beginner. The Psion instructions are equally useful but those provided by Hewson are not nearly as well put together and might be confusing for the novice.

When playing Backgammon, the visual impact of the board and layout of the 'men' is vitally important — you need to be able to assess your position and your opponents at a glance, so the graphics are a prime consideration.

On loading, Hewson offers a choice of single game, points series, gambling series or a demonstration game. The latter is very helpful for the newcomer and compensates a little for the deficiency in written instructions. There is also a choice of static levels and you can choose who starts the game, although, strictly speaking, that is against the rules.

The board is swiftly presented but unfortunately it is not easy to see, either in colour or black and white. The 'men' do not stand out from the board and the computer moves are made much too quickly for the experienced player to follow, let alone the novice. A record of the moves appears on screen below the table. The Hewson graphics are simple and not very effective compared to the others.

Load the C P version and you are presented with brief instructions for play, which neither of the others provides on-screen, but there is no choice of skill level. The graphics are much better than those of Hewson, though the board is drawn very slowly, that part of the program being in Basic. The definition is good, making the men easily visible in colour, and only a little less so in black and white, but since the points are not coloured alternately as they should be it is often difficult to calculate your moves. In this program the chosen pieces flash before a move is made so that it is easy to follow and a record is kept below of the moves, but it is SLOW and your moves have to be entered singly, which can be frustrating when a double is thrown.

'The CP graphics are much better than those of Hewson, though the board is drawn very slowly, that part being in Basic. The definition is good, making the men easily visible'

In its normal fashion, Psion presents a screen display for you to look at while the game is loading, even though the screen takes almost as long as the game to load. Incidentally that was a black mark for Psion: whoever drew its screen should have realised that opposite faces on a dice add to seven rather than adjacent ones. That criticism, however, should not detract from the spectacular nature of board display. You select from four skill levels, with a demonstration game available, and then are given the opportunity to input your own dice throws. It is the only one of the three which allows this, a feature which other games programmers would be wise to copy since your faith in the randomness of the RND generator will be shaken by the dice thrown in all the programs.

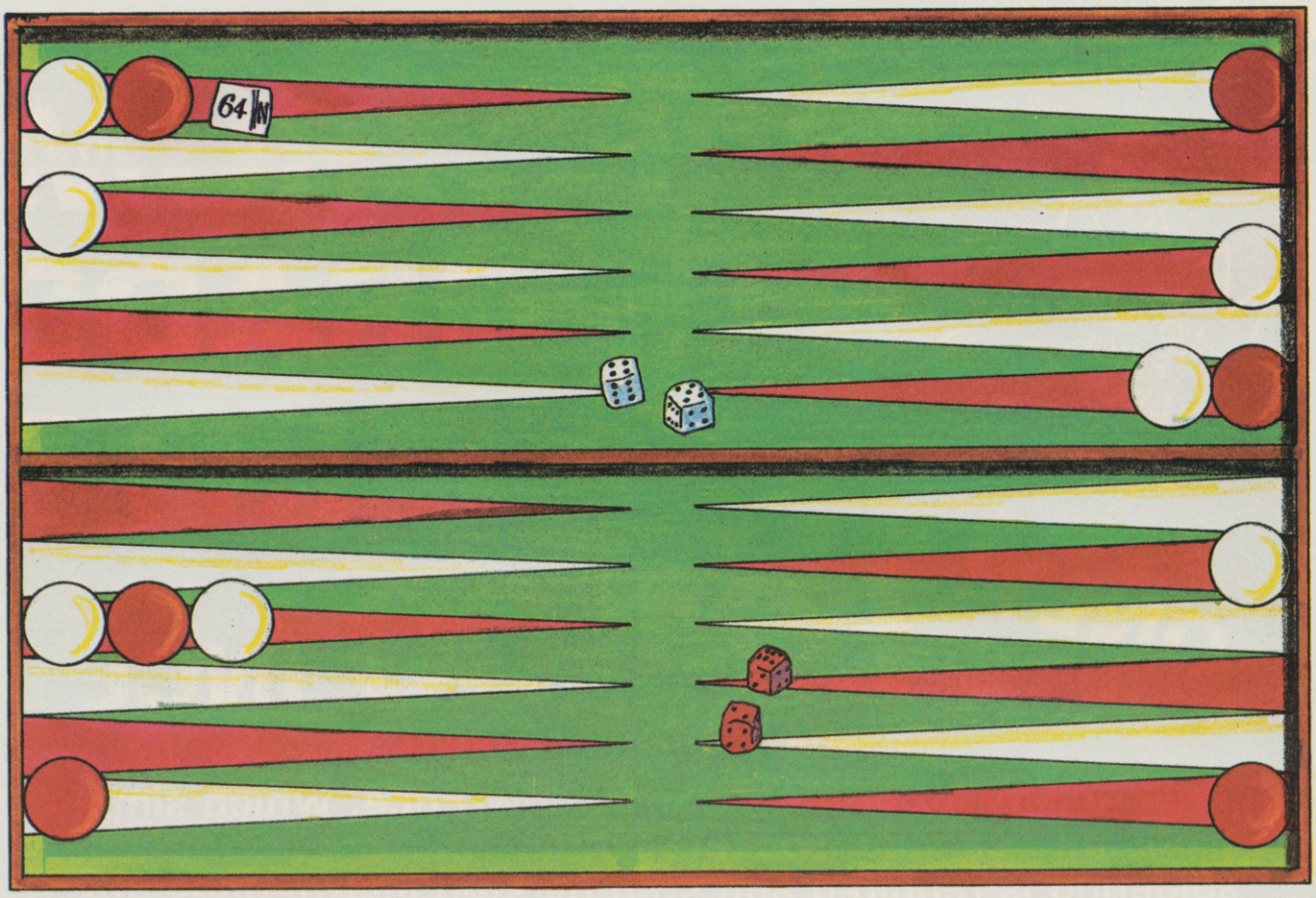
The board is drawn quickly with the points coloured alternately in black and white and the pieces, large enough to see easily, four character squares, in red and cyan. The definition is not lost when using a black and white television. The dice 'roll' in 3D up the screen and the pieces move across the board from point to point, making it simple to follow the course of the game. On the points with more than five men, the pieces appear to stand on their edges to make space, whereas the other two games resort to using numbers in that situation. When blots are hit, they travel gracefully to the bar, where a maximum of two men of any one player are shown at a time.

In the middle of the bar is the doubling cube, which moves from player to player in use. Hewson is the only other game to offer doubles but only in its gambling series.

Moves can be changed after they have been made by use of the DELETE key, the men retracing their steps across the screen. EDIT elicits suggested moves to help the novice player throughout the game. The graphic display is well-designed and effective.

All the games use the conventional rules of play, as published by Hoyle, but for scoring C P has no doubling option, an integral part of the modern game. Hewson uses its own method of calculating points instead of the accepted one. Only Psion scores correctly.

Hewson plays erratically, sometimes being very conservative and at other times taking wild risks. Moreover, by moving about frequently within its own inner table it is unable to take full advantage of the dice. When playing a back game it does not persevere long enough and on one occasion when one of its men was on the bar and most of its opponent pieces had been borne off leaving a blot on the three, Hewson threw five/three and came in on the five, thus losing a gammon. Apart from that instance it usually 'hits' at almost every opportunity and so it can be trapped by a skilful opponent. On the whole the level of play, even at its



highest, is moderate and does not provide a stimulating challenge to an experienced player.

It is interesting to note that M Male, the author, also wrote the excellent air traffic control simulation, Heathrow, for Hewson.

C P is another fanatical taker, but rarely takes the conventional precaution of building houses in its inner table. On the rest of the board its moves are generally conservative but its defeats of Hewson, as indeed when Hewson beat it, depended on some very lucky dice throws towards the end of the game. The two programs are well matched, their skill levels being about the same and their strategies very similar.

Psion plays a much more sensible game and provides more of a challenge. It makes better and more frequent use of the standard openings and its strategy throughout the game is more consistent. It protects its inner table and leaves few unnecessary blots but once again when playing a back game it tends to lack conviction and runs for home too soon.

To test the abilities of the games a 'tournament' was arranged. Each program played five games against each of the others. The results, shown in the table, were surprisingly even.

It was expected, on the basis of playing the game individually, that the result to be would Psion first, Hewson and then C P. None of those programs, however, can assess the play of its opponent, which is why they fail to take advantage of each other's faults. Human players would assess and eventually predict their opponent's moves, frustrating a back game by refusing to hit blots, or avoiding blots left as obvious traps.

> 'Results depended often merely on the luck of the dice'

Since the programs cannot do that, the Psion game, for example, fails to realise that its opponents play consistently badly, and cannot capitalise on that as a human player does. For the same reasons, Hewson and C P opposed each other three times with identical strategies and neither was able to realise that and alter its play accordingly. The results therefore depended often merely on the luck of the dice.

The Psion game is programmed entirely in machine code and so uses the comparatively small space available on a 16K machine efficently, even using the spare space in the printer buffer for the table of the positions of the men on the boards. When the Microdrive becomes available it may be a problem to fit it in. On the other hand Hewson and CP are written, predominantly in Basic, Hewson about 70 percent and CP nearly 90 percent; that makes them somewhat cumbersome and would, particularly in the case of C P, welcome the use of a good compiler.

RESULTS

	1	2	3	4	5	
Psion v. Hewson	G	W	B	W	W	Psion wins 5/3
Hewson v. CP	G	W	G	W	W	CP wins 8/1
CP v. Psion	G	W	W	G	G	Draw

W = Win G = Gammon B = Backgammon

FOX ELECTRONICS *Presents*

SPECTRUM UPGRADE KITS

LOWEST PRICE EVER!!!

ONLY! £21.00 INCL

(issue 2 machines only)

A high quality kit at a new Low, Low Price, which simply plugs into existing sockets within your Spectrum. No soldering is required and step by step instructions are supplied.

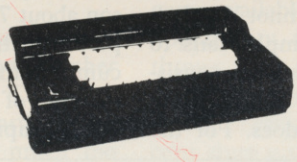
PROBABLY THE BEST KIT AVAILABLE AT DEFINITELY THE LOWEST PRICE

Should you require any more information on the kit (or any other items). Please phone or write to us at the address below.

SPECTRUM/ZX-81 FULLER FD42 KEYBOARD

£29·95 INCL

FOR THE SPECTRUM OR ZX-81. A42 KEY FULL TRAVEL, CASED KEYBOARD WHICH YOUR MACHINE SITS INSIDE, PLUGS IN (NO SOLDERING REQ).



SPECTRUM JOYSTICK

A DELUXE JOYSTICK CONTROLLER COMPLETE WITH INTERFACE AND

- CONTOURED GRIP
- 2 FIRE BUTTONS
- 4 FEET OF CORD
- 4 SUCTION CAP GRIPS FOR TABLE

TOP CONTROL **£19·50**

DEALER ENQUIRIES WELCOME

Many other Products

SEND NOW TO:

FOX ELECTRONICS

141 Abbey Road, Basingstoke, Hants. Tel: 0256 20671

AVAILABLE EX-STOCK
Send S.A.E. for details

CALLERS WELCOME BY APPOINTMENT

BARCLAYCARD VISA

ZX-81

THE BEST AVAILABLE EXPANDABLE RAM PACK AT THESE NEW LOW PRICES!!

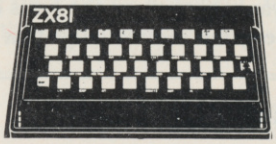
16K **£19.50** +45p P&P

32K **£34.00** +45p P&P

The ZX-Panda a specially contoured unit designed to eliminate wobble and memory loss, housed in a very attractive case with red LED on/off indication.

ZX-81

Another replacement keyboard-this one with a calculator type feel. Peel off backing and press to fit. Incredibly low price of £10.00



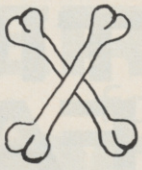
ZX81 ZX81

HANDWRITING

Now your micro (Spectrum 48k, BBC 'B') can teach your child how to write. Chalksoft have computerised Christopher Jarman's handwriting scheme as taught in schools throughout Britain. LETTERS (5 programs + booklet) and CAPITALS (6 Programs + booklet) both £11.25 each (inc. VAT), draw lower-case letters of the alphabet and capitals respectively. Numerals included in CAPITALS. Interactive, full colour and sound. A boon to the busy Reception teacher or parent.

PIRATE

is a new adventure game for young people. You are a pirate and it's your job to explore an uncharted ocean! Simple function-key presses (no spelling needed) ensure easy sailing around the new world. What will you find? Treasure trove? Savage islanders? There has NEVER been a BBC game like it! (Save-game feature included). Two programs for £9.25 (inc. VAT) (BBC 'B' and Spectrum 48k).



PUNCMAN

Available AT LAST for the Spectrum 48k. Thousands of children have improved their punctuation in schools all over Britain with our Beeb version. Now Spectrum families can give their children the same chance with the help of our famous happy duo — Nosher (who gobbles punctuation marks) and Puncman (who with your help puts them back). Fourteen original 'mini-stories' about this dynamic pair . . . £9.25 (inc. VAT).

DETAILS OF THESE AND MORE FROM (SAE, please):

Home/Trade enquiries/orders to:

CHALKSOFT

Chalksoft Ltd.,
37 Willowslea Road,
Northwick, Worcester
(0905 55192).

Educational orders direct to our educational distributors:
Ward Lock Educational,
47 Marylebone Lane,
London W1M 6AX (02 486 3271).

Also available from local dealers.

WLE
A Ling Kee Company

CHALKSOFT —the *innovators* in EDUCATIONAL software . . .

BUFFER MICRO SHOP

310 STREATHAM HIGH ROAD, LONDON SW16 6HG
Tel: 01–769 2887

Open Tues–Sat 10.30 am to 5.30 pm (Closed Mondays)

SOFTWARE FROM ALL THE BEST SUPPLIERS—OVER THE COUNTER—PLUS GROWING RANGE OF PERIPHERALS. SEE IT 'N TRY IT BEFORE YOU BUY IT.

SAE appreciated for catalogue—but please specify for which computer.

DRAGON ZX-81 ZX SPECTRUM

THE WORLD'S GREATEST RANGE OF
SINCLAIR SOFTWARE
PIONEERS IN 1981—WAY AHEAD TODAY

BBC-ACORN KEYBOARDS CASSETTES ADD-ONS BOOKS VIC20

NEW!—BUFFER CLUB for regular customers. Special Offers—Lectures—Foreign Trips—Software Promotions. Ask for details of membership on your next visit.

MEMBER OF THE COMPUTER TRADE ASSOCIATION—YOUR FAIR DEAL GUARANTEE

VISA—ACCESS—AMERICAN EXPRESS—DINERS CLUB
ALL CARDS WELCOME

RUMBELOWS
We save you money and serve you right.

SAVE £1

Special offer exclusive to Sinclair User

£1 off all software at Rumbelows

Take this voucher to any branch of Rumbelows which has a computer department and exchange it to save £1 on any piece of Sinclair software.

£1 off at RUMBELOWS with this voucher

Voucher Voucher Voucher Voucher Vo
Voucher Voucher Voucher Voucher Vo
Voucher Voucher Voucher Voucher Vo
Voucher Voucher Voucher Voucher Vo
Voucher Voucher Voucher Voucher Vo
Voucher Voucher Voucher Voucher Vo
Voucher Voucher Voucher Voucher Vo

This offer closes on October 31 and is available only on software on display in Rumbelows stores. Not redeemable against past purchases only 1 coupon per product.

AGF

MICRODRIVE C

PROGRAMMABLE JOYSTICK INTERFACE for Spectrum or ZX81

ONLY 32-95 +£1·00pp

PROGRAMMABLE INTERFACE

The AGF Programmable Joystick Interface is a unique design offering the use of any Atari-compatible joystick with absolutely all software, whether it is cassette or ROM cartridge, with the Sinclair Spectrum or ZX81.

The hardware programmable interface requires no additional software and accurately replicates the keys of the computer in a manner which is responsive to absolutely *ALL* key reading methods, both BASIC and Machine Code.

The interface does not interfere with key operation and can therefore be used simultaneously with the keyboard.

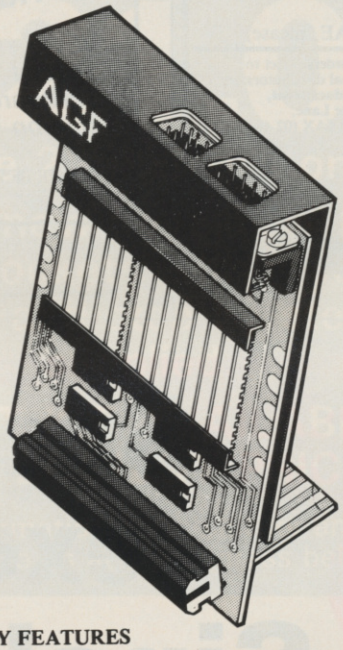
There is no need to remove the interface once fitted as the rear extension connector will accommodate further expansion, i.e printers or RAM packs etc. This important feature avoids excessive wear to the expansion port.

The key replication principle pioneered by AGF means that your own programs can use eight directional joystick movement by utilising simple key reading BASIC.

Two joystick sockets are provided which share the same keys, for use with the majority of two player games. Several interfaces may be used on the same computer for multiple joystick applications.

The interface is programmed by a two digit code, which is looked up on a programming chart supplied, for each direction and firing button. The two numbers are then selected on a pair of leads which are clipped onto appropriately numbered strips on the interface.

Once configured this can be marked on a Quick Reference Programming Card for storing with the game. As the programming is *not* power dependent the interface retains the last configuration made and can be immediately used when next switched on.



KEY FEATURES

- ★ Programmable design gives TOTAL software support.
- ★ Accepts Atari, Competition Pro, Wico, Starfighter, Quick Shot, Le Stick etc.
- ★ Rear extension connector for all other add-ons.
- ★ Free demo program and instructions.

PACKAGE CONTENTS SUPPLIED

- Programmable Interface Module as illustrated, complete with clip-on programming leads.
- Self adhesive programming chart detailing how to define which key is simulated by UP, DOWN, LEFT, RIGHT, and FIRE. This can be fixed on to the case of your computer or if preferred the protective backing can be left on. The chart is made of a very durable reverse printed plastic and is extremely easy to read.
- One pack of ten Quick Reference Programming Cards for at-a-glance setting to your games requirements. The card allows you to mark the configuration in an easy to read fashion with space to record the software title and company name.
- Video Graffiti demonstration program which is written totally in BASIC to illustrate how all eight directions and fire can be read. This is also a useful high resolution drawing program.
- 12 months guarantee and full written instructions.

JOYSTICKS

CONTROLLERS

FOR USE WITH OUR INTERFACE Module or VIC 20, Commodore 64, Atari VCS, Atari 400, Atari 800

If you require extra Joysticks for our original interface module mark order 'OLD' Joysticks

ONLY £7.54 inc VAT + P&P

PLEASE ALLOW 28 DAYS FOR DELIVERY

ALL ORDERS CONFIRMED

FROM: MR/MRS/MISS

ADDRESS

SEND C.W.O. (NO STAMP NEEDED) TO: A.G.F. HARDWARE, DEPT. SU,

FREEPOST, BOGNOR REGIS, WEST SUSSEX, PO22 9BR

QTY	ITEM	ITEM PRICE	TOTAL
	PROGRAMMABLE INTERFACE	33.95	
	JOYSTICK(S)	7.54	
	PACK(S) QUICK REFERENCE CARDS	1.00	
ONE	VIDEO GRAFFITI	FREE	
		FINAL TOTAL	

ZX81 ☐ ZX SPECTRUM ☐ Please tick

DEALER ENQUIRIES WELCOME *EXPORT PRICES ON APPLICATION*

E COMPATIBILITY

Computer Trade Association Member

JOYSTICK INTERFACE II for Spectrum or ZX81

NEW PRICE

ONLY ~~19.95~~ +£1.00pp 15.95

JOYSTICK INTERFACE

The Interface Module II has been specially designed to plug on to the rear connector of your ZX Spectrum or ZX81 and allow you to connect any standard Atari type digital Joysticks. All of the computer's connections are duplicated on an extension connector so that you can still use any other devices intended for use with your computer.

The Interface Module II resides in the same memory space as the keyboard, which remains fully functional at all times, therefore it will not interfere with anything else connected.

When a suitable joystick is plugged into 'Player 1' socket its action will mimic pressing the cursor keys, up "7", left "5" and so on. The firing button will simulate key ϕ. This unique feature guarantees the best software support.

Take a look at the selection of compatible games we have listed. More are being added all the time as a result of our contact with the various software companies.

A second Joystick may be connected in the 'Player 2' position which simulates in a parallel fashion keys T-Y-U-I-P. This will allow you to play a whole new generation of two player games.

COMPATIBILITY CASSETTES ☐ £4.95

These cassettes have short programs to load before the chosen game which will convert it to use the cursor keys and therefore become compatible with the Interface Module II.

Cassette One converts:

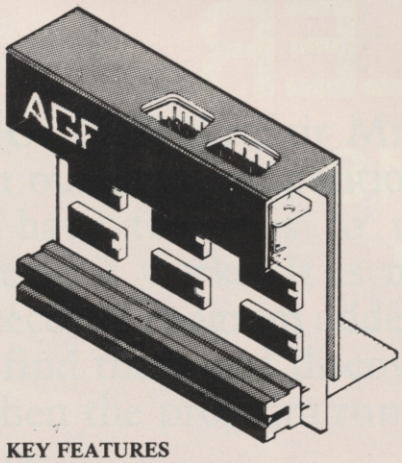
ARCADIA
SCHIZOIDS
HUNGRY HORACE
HORACE GOES SKIING
SPECTRES
PENETRATOR

NEW!

Cassette Two converts:

CENTIPEDE
PLANETOIDS
JET-PAC
† PSSST
† 3D COMBAT ZONE
† INVADERS

† Will require 48K Memory



KEY FEATURES

- ★ Proven cursor key simulation for maximum software support
- ★ Accepts Atari, Competition Pro, Wico, Starfighter, Le Stick, etc Joysticks
- ★ Second Joystick facility
- ★ Eight directions programmed in simple BASIC

JOYSTICKS

CONTROLLERS
FOR USE WITH OUR INTERFACE
Module II or VIC 20, Commodore 64, Atari VCS, Atari 400, Atari 800
If you require extra Joysticks for our original interface module mark order 'OLD' Joysticks
ONLY £7.54 inc VAT + P&P

☐ *Available from us*

** State "AGF version"*

JOYSTICK INTERFACE II COMPATIBLE SOFTWARE

ZX SPECTRUM

Abbex	...	*	Spookyman	
		*	Invasion	
		*	Harrier	
		*	Cosmos	
		*	The Android Run	
		*	High Noon	
		*	ETX	
Abersoft	...		Mazeman	
			The Wizards	
			Warriors	
			Spectroid Storm	
Apocolypse Software	...	☐	Galactic Jailbreak	£4.95
Axis	...		Labyrinth	
Blaby	...		Confusion	
			Chopper Rescue	
			Gold Digger	
Campbell Systems	...		Gulpman	
CDS Micro Systems	...		Leapfrog	
C. Tech	...		Specman	
Digital Integration	...		Night Gunner	
			Fighter Pilot	
D.J.L. Software	...		Froggy	
DK 'Tronics	...	☐	3D Tanx	£4.95
			Meteoroids	
Hewson Consultants	...		Nightflite	
			Specvaders	
			Mazechase	
ICL	...		Star Trail (Man.Dock)	
Imagine	...		Zzoom	
Megadodo Software	...		Pheenix	
Micromania	...		Ghost's Revenge	
New Generation	...	☐	Escape	£4.95
Software		☐	3D Tunnel	£5.95
		☐	Knot in 3D	£5.95
Newsoft Products	...		Time Bandits	
			Spectral Maze	
Psion	...		VU–3D	
			Flight Simulation	
Quest	...		Violent Universe	
Quicksilva	...		Meteor Storm	
			Space Intruders	
R + R Software	...		Gnasher	
			Spectipede	
Richard Sheppard	...		Trans. Tower	
Silversoft	...		Ground Attack	
		☐	Cyber Rats	£5.95
Vectis Software	...		Pony Express	
			Vec-Man	

PLEASE ALLOW 28 DAYS FOR DELIVERY **ALL ORDERS CONFIRMED**

FROM: MR/MRS/MISS

ADDRESS

SEND C.W.O. (NO STAMP NEEDED) TO: A.G.F. HARDWARE, DEPT.SU,

FREEPOST, BOGNOR REGIS, WEST SUSSEX, PO22 9BR

QTY	ITEM	ITEM PRICE	TOTAL
	INTERFACE MODULE II	16.95	
	JOYSTICK(S)	7.54	
	SOFTWARE:		
	SOFTWARE:		
ZX81 ☐	ZX SPECTRUM ☐ Please tick	FINAL TOTAL	

DEALER ENQUIRIES WELCOME *EXPORT PRICES ON APPLICATION*

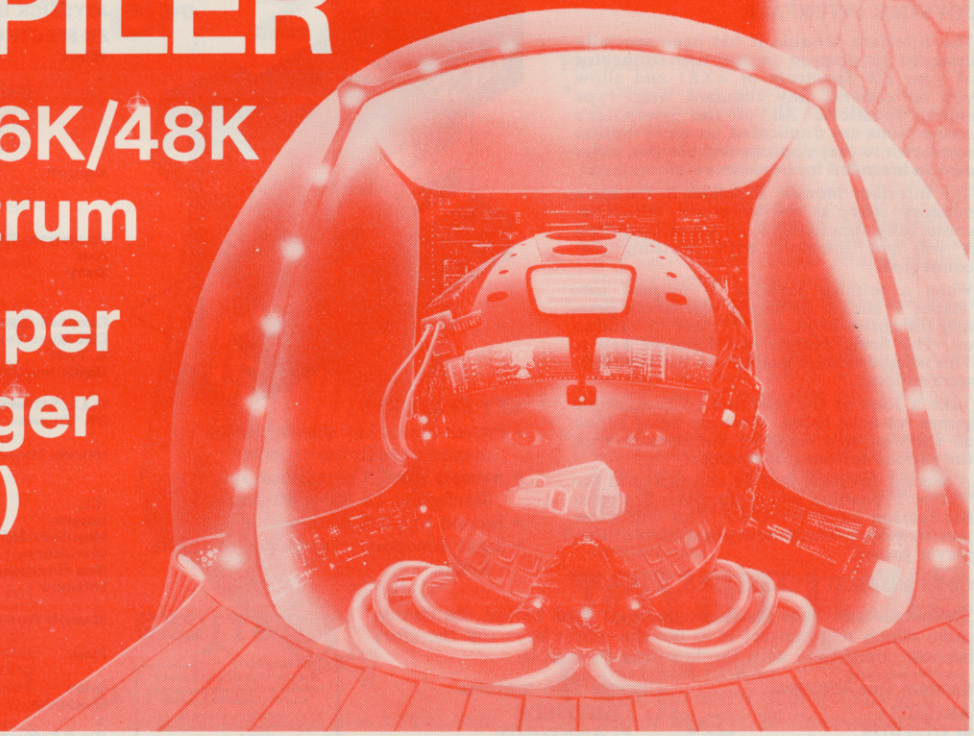
SOFTEK

MASTERS OF THE GAME

Finally!... A Full Floating-Point COMPILER

For The 16K/48K ZX Spectrum

(and a Super New Integer Compiler)



SOFTEK FP COMPILER

This amazing product is the first and only **full** Floating Point Compiler for the ZX Spectrum. It will handle all but a few commands on the Spectrum, which is approximately twice the capability of any Integer Compiler. It will handle full Boolean logic, strings and non-multidimensional arrays. With this, the only true full compiler for the ZX Spectrum, you can now convert all your favourite BASIC programs into Machine Code. An unbelievable product at the unbelievable price of just **£19.95** (16K and 48K versions on one tape).

SOFTEK IS COMPILER

June's PCW review of Compilers raved about our previous Super C but put a new product from 'Wye Valley Software' top of its list of recommendations. Softek are proud to announce that their new Integer Compiler was commissioned from Martin Lewis of Wye Valley, having gained exclusive rights to their Integer Compiler.

The Softek IS Compiler is the ultimate in Integer Compilers for the ZX Spectrum. Following the immense success of our Super C Integer Compiler (it is **still** the only utility to have made it into the 'Top Ten' charts) , the IS Compiler is even better. It has full string handling and string slicing capabilities (unlike its competitors) and full INPUT facilities, exactly as you enjoy in BASIC. Our famous 'REM' statement enhancements to BASIC are in the IS Compiler too, allowing such features as Hi-Res graphics and the entry of Machine Code subroutines. Like the FP Compiler the IS copier will compile subroutines, can be used easily alongside BASIC, and can compile code to virtually any given start address in RAM. Unlike Super C, both of our new Compilers will allow up to 16K of BASIC to be compiled in a 48K ZX Spectrum.

For the fastest, most feature-laden Integer Compiler on the market it **has** to be the Softek IS Compiler at just **£9.95.** (16K and 48K versions in one tape).

THE SOFSYS SYSTEM

Our raved-about Sofsys System of utilities, is now complete with the addition of SOFSEM, our superbly well-designed Editor/Assembler for the Sinclair Spectrum. It features fantastic 'user friendliness' (with full error reports), 42 or 32 column screen format, HELP facility, extensive labelling features, and super fast assembly. Unbeatable at only **£6.95.** Super Monitor, SOFMON, still only **£5.95.**

Our superb Toolkit, Graphics Kit and remarkable Masterkey (user defined keys program) are still available for just **£5.95** each.

WARNING: CONDITIONS OF SALE

All Softek Software is sold strictly according to our terms and conditions of sale, copies of which are available upon request.

Softek Compilers are sold on the condition that, if they are used to create a product sold commercially for financial gain, then the fact that the product was created with a Softek Compiler must be accredited clearly in both advertising of the product and on the exterior of the packaging of that product, start screen, promotional materials, etc.

GSH

SOFTEK SOFTWARE
12/13 HENRIETTA STREET, LONDON WC2
Tel: 01-240 1422

All Softek Software comes with a perpetual guarantee. Should it ever fail to load return it for a replacement. If the tape shows signs of physical damage then please enclose £1.50 to cover costs.

COMPLETE THIS COUPON AND WE'LL RUSH YOU SOFTEK'S FABULOUS NEW SOFTWARE!

SOFTEK FP COMPILER ☐ £19.95
SOFTEK IS COMPILER ☐ £ 9.95
SPECIAL INTRODUCTORY OFFER OF BOTH FP AND IS COMPILERS IN ONE PACKAGE ☐ £24.95

SOFSEM ☐ £6.95 TOOLKIT ☐ £5.95
SOFMON ☐ £5.95 GRAPHICS KIT ☐ £5.95
MASTERKEY ☐ £5.95

Please send me the Software as ticked

Total cheque/P.O. enclosed £ : payable to 'SOFTEK'

PLEASE SEND ME A CATALOGUE ☐

NAME.....

ADDRESS.....

.....

SOFTEK SOFTWARE
12/13 HENRIETTA STREET, LONDON WC2

Spot the bugs and win a Microdrive

WIN A FABULOUS Sinclair Microdrive and networking interface in our new competition.

All you have to do is to unscramble the lines of program below so that it works. It is not as simple as it looks. There are several pieces of program added and several bits of code deleted. If you can find them and discover the secret code which will be displayed when the program runs you are on your way to winning a microdrive.

All entries must be received by October 31.

The usual conditions about the editor's decision being final and employees of ECC Publications and associated companies being ineligible apply.

```
 10 REM PRINT CHR$ (211): PRINT
;
 20 NEXT M
 30 FOR K=1 TO 2
 40 NEXT K
 50 PRINT "WELL DONE"
 60 REM DIM A(39)
 70 LET C=CODE ("H"): LET D$=CH
R$ (C+12)
 80 PRINT "CODE=";
 90 DATA 29,108,692,23,49,76,85
,3,18,492,"",83,47,30,11,78,85,5
7,33,1,88,57,19,62,0,7,61,10,26,
21,26,26,26,7,18,61,31,14,2,61
 110 PRINT D$;
 120 FOR M=1 TO 20
 130 PRINT MICRODRIVE COMPETITIO
N
 140 PRINT A(CODE ("/"));
 150 FOR K=1 TO 39: READ A(K): L
ET A(K)=8: NEXT K
```

ENTRY FORM

The secret code is .....

.....

Name .....

Address .....

.....

Send your entries, marked Microdrive Competition, to Sinclair User, 196–200 Balls Pond Road, London, N1 4QA to arrive not later than October 31.

SPECT

BOOKS BY MELBO

Over the Spectrum

30 exciting, easy to enter programs designed specifically for the Spectrum.

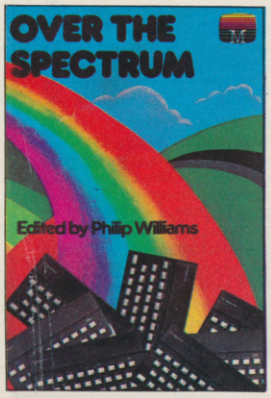
"A clear winner in the Spectrum stakes." – Personal Computer World

"A collection of truly outstanding programs." – Educational Computing

"A book to make you think rather than just a source from which to copy programs." – Computing Today

"A book that will continue to offer advice and instruction as your own skill increases." – ZX Computing

New Low Price



Understanding Your Spectrum

A complete guide to the Spectrum software system for users who want to learn how to program in both Basic and Machine Language.

"I cannot recommend this book too highly." – Practical Computing

"Excellent in content" – Sinclair User

"A must. This book can be summed up as a go beyond book." – Educational Computing

"Logan is dedicated to getting every grain of truth out of these computer chips. Invaluable." – Education Equipment

New Low Price

Spectrum Machine Language for the Absolute Beginner

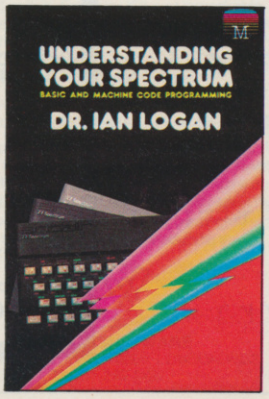
A "no jargon" introduction to Machine Language for Spectrum users keen to progress beyond the limitations of BASIC.

"One of the best I have seen on the subject – for once the title is on the nose." – Popular Computing Weekly

"Very readable and excellent value for the beginner." – Sinclair Users' Annual

"An excellent book for anyone wanting to start programming in an alternative to Basic." – What Micro

New Low Price



The Complete Spectrum ROM Disassembly

For the serious programmer who wants to get right to the heart of the Spectrum: its 16K ROM control program.

"A useful and interesting book." – Personal Computing News

"The detail is ingenious – amazingly so." – Educational Computing

"A great relief to Machine Code programmers who want to get to grips with the Z80A processor." – Sinclair User

Spectrum Hardware Manual

An in depth explanation for the hobbyist who wants to know how the Spectrum works.

"At last a book to explain exactly what is inside the Spectrum ... plenty of illustrations and detailed explanations.' – Educational Computing

"The text is well illustrated, thorough and thoughtful ... a wealth of ideas for projects." – Education Equipment

"The second most useful book you can buy for your Spectrum – the first being the programming manual that comes with your machine. Very useful stuff indeed." – Personal Computer News

RUM

OURNE HOUSE

If you demand the best from your Spectrum, Melbourne House has the right book for you.

Ranging from a collection of simple to enter programs to in-depth technical data, every book in our range shows how to really extend the potential of your own Spectrum.

Melbourne House Computer Books — Serious Spectrum Computing Made Simple.

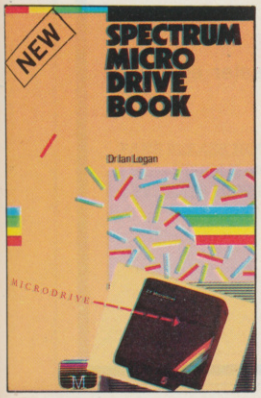
Spectrum Microdrive Book

In this book Dr. Ian Logan gives a detailed explanation of the Spectrum Microdrive – the revolutionary high speed memory storage system.

How it works, its capabilities from Basic and Machine Language and the networking and RS232 possibilities are all thoroughly detailed.

A special section deals with the amazing capabilities of the interface including how to add more commands to BASIC!

Anyone who wants to expand the capabilities of the Spectrum beyond its present limits must read this book.



Supercharge Your Spectrum

Extend your Spectrum with ready-made machine language routines.

Now without any additional effort you can overcome the limitations of BASIC — faster programs, more powerful graphic commands, realistic explosions, fast screen scrolling, great sounds . . . .

Routines in this book will also allow you to renumber your program, trace a program during BASIC, reproduce your voice and much more! Whether you are a beginner user or an experienced Spectrum programmer, SUPERCHARGE YOUR SPECTRUM is a book you cannot be without.

Orders to:
Melbourne House
131 Trafalgar Road
Greenwich, London SE10

Correspondence to:
Melbourne House,
Church Yard, Tring,
Hertfordshire HP23 5LU

All Melbourne House cassette software is unconditionally guaranteed against malfunction.

Trade enquiries welcome.

☐ Please send me your free 48 page catalogue.
Please send me:

Books

- ☐ Over The Spectrum . . . . . **New Low Price** £4.95
- ☐ Spectrum Machine Language for the Absolute Beginner . . . . . **New Low Price** £5.95
- ☐ Understanding Your Spectrum . . **New Low Price** £6.95
- ☐ The Complete Spectrum ROM Disassembly . . . £9.95
- ☐ Spectrum Hardware Manual £5.95
- ☐ Spectrum Microdrive Manual £5.95
- ☐ Supercharge Your Spectrum £5.95

Cassettes 16K

- ☐ Over The Spectrum No. 1 . . . . . £5.95
- ☐ Over The Spectrum No. 2 . . . . . £5.95
- ☐ Over The Spectrum No. 3 . . . . . £5.95
- ☐ Programs from Spectrum Machine Language Book £5.95

Cassettes 48K

- ☐ The Hobbit £14.95
- ☐ Penetrator £6.95
- ☐ Terror-Daktil 4D £6.95
- ☐ Melbourne Draw £8.95

£ . . . . . .

Please add 80p for post and pack £ 80

TOTAL £ . . . . . .

I enclose my ☐ cheque
☐ money order for £ _____

Please debit my Access card No. . . . . .

. . . . . .

Expiry Date . . . . . .

Signature . . . . . .

Name . . . . . .

Address . . . . . .

. . . . . .

. . . . . .

. . . . . Postcode . . . . . .

Access orders can be telephoned through on our 24-hour ansafone (01) 858 7397.

SU10A

Upgrade your 16K ZX SPECTRUM Now!

The CHEETAH 32K RAMPACK simply plugs into the user port at the rear of your computer and increases the memory instantly to 48K.

- ★ Fully compatible with all accessories via rear edge connector
- ★ No need to open computer and invalidate guarantee
- ★ Why send your computer away and wait weeks for upgrade
- ★ Fully cased tested and guaranteed.

Why wait any longer?

Only £39.95 including VAT and P&P.

Now make your Spectrum and ZX-81 Talk

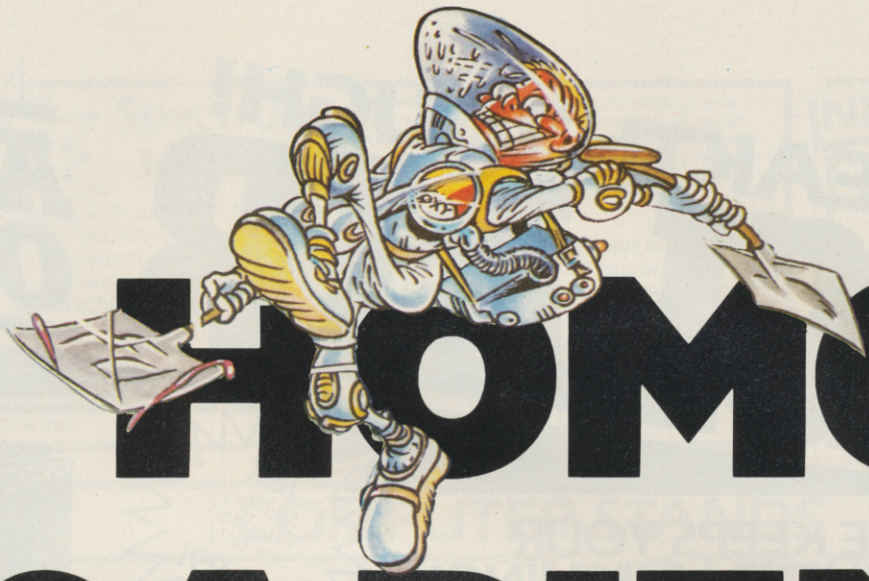
The Cheetah "SWEET TALKER" just plugs into the back of the computer using the existing power supply. Based on an allophone system you can easily program any word sentence or phrase. Fully cased, tested guaranteed and compatible with all accessories via rear edge connector. Complete with demonstration cassette and full instructions. No more lonely nights! Simply incredible at **£34.95.** Please quote when ordering whether Spectrum or ZX-81 Sweet Talker required.

16K RAM Pack for ZX-81	**£19.75**
64K RAM Pack for ZX-81	**£44.75**

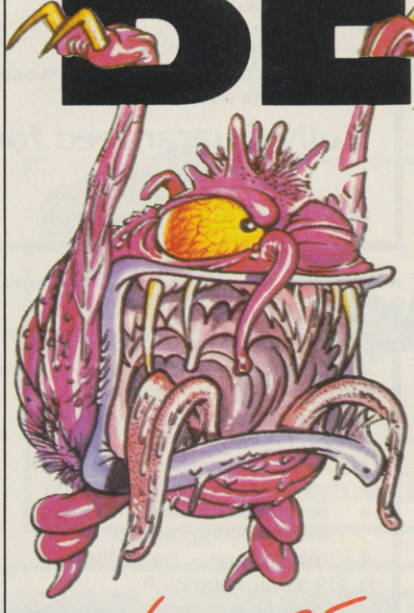
Prices include VAT, postage & packing. Delivery normally 14 days. Export orders at no extra cost. Dealer enquiries welcome.

Send cheque/PO now to:
CHEETAH MARKETING LTD
Dept SU/10
359 The Strand
London WC2R 0HS
Tel: 01-240 7939

32K Ram Pack also available from larger Branches of Boots John Menzies and computers for all dealers.



HOMO SAPIENS BEWARE



There's magnetic quartz in them thar hills! Not to mention ferocious fauna, battling beasties and miserable mutants. What's more, they're out to get you.

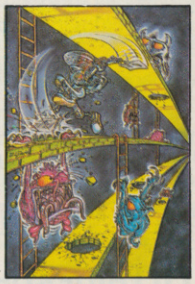
The stakes are high, but with 9 levels of play and up to 7 creatures chasing you at a time, so are the risks.

All you've got to protect you is a long handled shovel. Catch the beasties, whack the beasties and you'll see them off into a hole. Hesitate for a moment and you're fast running our of air. Hesitate for too long and you're dead.

Sheer panic. It's creepy. It's crawly.
And it's another great game from Visions.
The ultimate name in video games.

Visions

FANS PLEASE NOTE! ALSO AVAILABLE MAIL ORDER
FROM VISIONS (SOFTWARE FACTORY) LTD
1 FELGATE MEWS, STUDLAND STREET, LONDON W6



SHEER PANIC VS-02-16

SNOOKER VS-03-1/4

PITMAN SEVEN VS-01-48

MAJOR PRICE BREAKTHROUGH!

SINCLAIR ADD ONS

MICROCARE KEEPS YOUR COMPUTER HUMMING!

Spectrums and Dragons only £22.40 +(£1.50 p+p)
ZX 81 only £15.50+(£1.50 p+p)
Atari 400 and 800 only £24.90+(£2.00p+p)
Commodore VIC 20+C64 only £24.90+(£2.00p+p)
BBC Micro A+B only £24.90+(£2.00p+p)

No, you're not dreaming! Those are the prices charged by MicroCare for repairing any electronic fault, however serious, in the above computers. They are £££££'s below the price of Sinclair's repair service, **and we give a guarantee!**

We'll return it promptly, and we'll quality check your unit before it leaves our service centre.

We have the experience it takes. We have the parts on hand. So act now. Let MicroCare get your computer humming again!

When sending in your computer, please enclose a brief description of the fault, and make sure that your address is clearly indicated. **Do not send leads or power plugs.**

Cheques to be made payable to MicroCare, Order ref: MC1 £19.90+(£1.00p+p)
MC2 £12.50+(£1.00p+p)
MC3 £24.90+(£2.00p+p)
MC4 £24.90+(£2.00p+p)
MC5 £24.90+(£2.00p+p)

Personal callers welcome
Monday – Friday
9.30 – 5.00pm

16K Memory extension for only £15.99!

FABULOUS SINCLAIR ADD-ON OFFER FOR ZX81 OWNERS

These are the real thing. ZX81 memory extensions made for the USA and specifically screened to stop radio interference.

- ★ no soldering
- ★ easy to fit
- ★ simply plug in
- ★ no loss of memory through wobble or white out

Fully Guaranteed for 12 months

ME1-16USA £15.99 plus 60p P + P

FANTASTIC
ZX81 & SPECTRUM SS1 SPEECH SYNTHESISER SIZE 3½" x 5¾" x 1"

- ★ Making amazing speech effects with your ZX Spectrum.
- ★ Specially designed for use with your Spectrum. Just plugs in, no dismantling or soldering.
- ★ No power pack, leads, batteries or other extras.
- ★ Ample volume from built in loudspeaker, Manual Volume Control on panel. Can be plugged in to existing hi-fi system.
- ★ Uses no memory addresses.
- ★ Free Dictionary of Sounds.

SS1 SPEECH SYNTHESISER £39.00 plus 60p P + P

NEW TAPE LOAD ANXIETY?

Vu load takes the frustration out of loading your ZX81 or Spectrum programmes.

- ★ helps to ensure programme load every time
- ★ monitors tape output level
- ★ gives positive save indication
- ★ detects blank tape without disconnecting cassette wires
- ★ ready to use – no wiring

TL £19.99 plus 60p P + P

NEW MICRO TAPE

save it – first time on American microtape

- ★ Specially designed for use with micro computers
- ★ Low drop out occurrance
- ★ Uniform coating
- ★ High saturation level
- ★ So good, we can guarantee them for 12 months

AUDIO DIGITAL AD.C12 – 55p; AD.C15 – 60p; AD.C20 – 65p; + 40p P + P

NEW LOW PRICE Series B ONLY £20.50!

Spectrum 16K-48K

With our ME48 memory expansion add-ons your Spectrum can increase its capacity by up to three times.

- ★ **no soldering**
- ★ **easy to fit**
- ★ **simple to plug in**
- ★ **fully guaranteed**
- ★ **no loss of memory through wobble or white out.**

NB. Before ordering your Spectrum add-on please check which Spectrum you have in your possession. At the back of the ZX Spectrum the metallic contact strips can be clearly viewed. In the series A the space separating the strips is the same width as the strips. In the series B the strips are twice as wide as the space between.

SPECTRUM

ME16-48 Series A £34.50 plus 60p P + P
Series B £20.50 plus 60p P + P
ME16-80 Series B £46.00 plus 60p P + P

ZX81

ME1-64 £44.25 plus 60p P + P

FITTING/TESTING SERVICE. While you wait, personal callers Monday – Friday 9.30-5.00, £3.00. By return of post £7.00.

NEW

LEVEL-VU PRISM

Allows you to see your tape counter without moving from your seat!

- ★ **attaches easily to recorder body or lid**
- ★ **fits most recorders including Radio Shack, Vic-20, Atari**
- ★ **greatly magnifies counter numerals**

LVP £3.99 plus 40p P + P

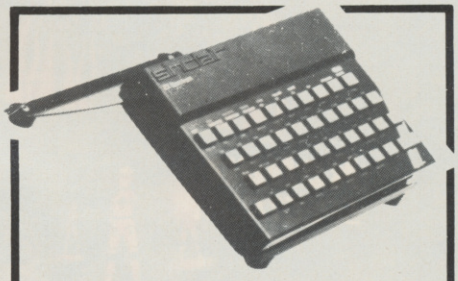
COMPUTER STANDS

POWER BASE

Raised stand for ZX81 and Spectrum. Fitted LOAD/SAVE switch, and power ON/OFF for screen clearing. Saves wear and tear on connections. Front lip holds computer in place. No soldering, comes complete with all necessary plugs and cables.

Spectrum ref. PBS1 £13.50 plus 95p P + P

ZX81 ref. PBZX81 £13.00 plus 95p P + P



COMPUTILT STAND

Designed to tilt the computer to a better working position. Front lip holds computer in place. Also useful as a document stand when entering information.

Spectrum or ZX81 ref. CS1 £4.50

plus 60p P + P

WOBBLE STOPPERS

At last, a fool proof method of avoiding ZX81 whiteouts caused by Ram-Pack wobble. Simply turn the plastic thumbscrew until the Ram-Pack is held firmly against the ZX81. No soldering no stick-on pieces, just common sense! Flat or tilted models.

Small flat ZX81 and Ram-Pack ref. SW
plus 60p P + P **£5.25**

Small tilted for ZX81 and Ram-Pack ref. STW
plus 60p P + P **£6.25**

Large flat or tilted for ZX81 and Ram-Pack and Printer ref.
LW **£5.75** flat LTW **£6.75** tilted plus 60p P + P

COMPUTER ADD ONS

7-9 Thane Works, Thane Villas, London N.7. Tel: 01-609 7919

Trade enquires welcome

ALL ITEMS NORMALLY DESPATCHED WITHIN 24 HOURS
Please tick appropriate box to order your Computer Add-On. MC1 ☐ MC2 ☐
MC3 ☐ MC4 ☐ MC5 ☐ ME16USA ☐
ME16-48 Series A ☐ Series B ☐ SS1 ☐
TL ☐ ADC12 ☐ ADC15 ☐ ADC20 ☐
ME16-80 Series B ☐ ME1-64 ☐
LVP ☐ PBS1 ☐ PBZX81 ☐ CS1 ☐
SW ☐ STW ☐ LW ☐ LTW ☐

NB. Add Post and Packing to the price of each item.
I enclose a cheque or postal order for_____ made payable/crossed to Computer Add-ons or MicroCare or I would like to pay by Access or Barclay Card and I enter my number and signature accordingly.
*Allow 28 days for delivery.

☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

Signature _____
Date _____

Name _____
Address _____
Occupation _____

SU7

COMPUTER ADD-ONS
7-9 Thane Works, Thane Villas London N7

SOFTEK

Masters of The Game

WATCH THIS SPACE

Games for SPECTRUM ORIC DRAGON BBC CBM 64

Coming Soon

Softek software for the Spectrum. Dragon and Oric should be available in most major outlets such as W. H. Smith, Lasky's, Spectrum and selected branches of Menzies as well as through our nationwide dealer network. Alternatively fill out this coupon and we'll rush you your Softek game by return of post!

WARNING! All programs are sold according to Softek's terms of trade and conditions of sale. Copies of which are available on request.

All Softek software comes with a perpetual guarantee. Should it ever fail to load return it for a replacement. If the tape shows signs of physical damage then please enclose £1.50 to cover costs.

GSH
Guild of Software Houses

SOFTEK SOFTWARE
12/13 HENRIETTA STREET, LONDON WC2
Tel: 01-240 1422

SPECTRUM GAMES:

OSTRON	☐ £5.95		
FIREBIRDS	☐ £5.95		
ROBON	☐ £5.95	**ORIC GAMES:**	
REPULSAR	☐ £5.95	GALAXIANS	☐ £6.95
MEGAPEDE	☐ £5.95	SUPER METEORS	☐ £6.95
MONSTERS IN HELL	☐ £5.95	**DRAGON 32:** MONSTERS	☐ £6.95

Please send me the games as ticked

Total cheque/P.O. enclosed £____:____ payable to 'SOFTEK'

PLEASE SEND ME A CATALOGUE ☐
PLEASE SEND ME DETAILS OF 'SOFSYS' YOUR HIGHLY ACCLAIMED UTILITIES FOR THE SPECTRUM ☐

NAME .....

ADDRESS .....

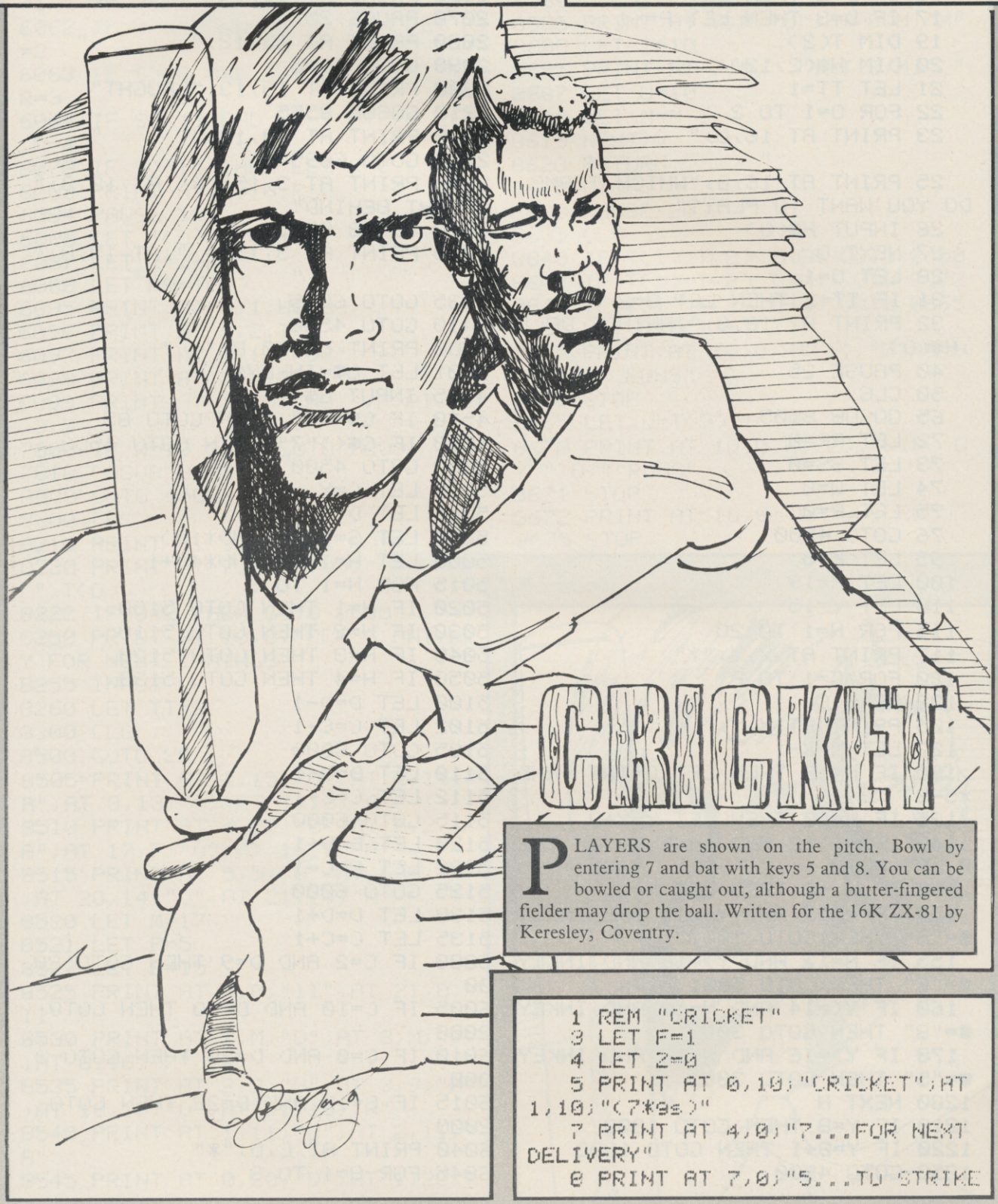
.....

SOFTEK SOFTWARE
12/13 HENRIETTA STREET, LONDON WC2

PROGRAM PRINTOUT

To help with entering graphics characters we have adopted a system of writing the characters for the ZX-81. We indicate inverse characters by the letter i and graphics by g, so that an inverse letter W is shown as iW and the graphics character on key 6 is denoted by g6. Spaces are shown by sp and inverse spaces are isp. If some occur together, for instance a row of six spaces , they are shown by *6sp and where there is a combination of characters each one is divided by a colon, thus sp:isp:6*g6 means a space followed by an inverse space and then six characters on the 6 key. Where whole words are written in inverse letters they appear in the listings as lower-case letters.

In the Spectrum listings, letters to be entered in graphics mode are underlined, while other graphics instructions are underlined and take the form shown above, with the addition that inverse graphics characters are represented by the letters "ig".



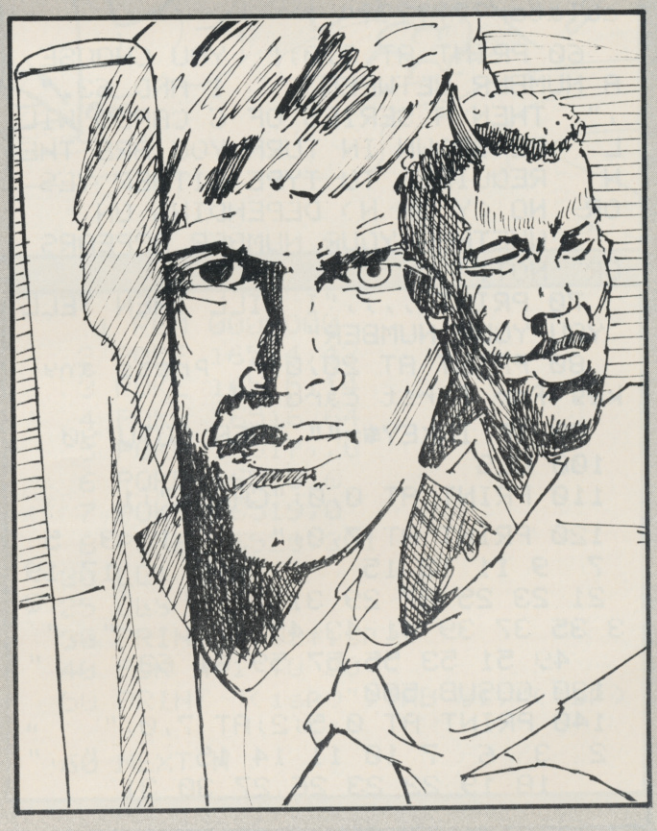
CRICKET

PLAYERS are shown on the pitch. Bowl by entering 7 and bat with keys 5 and 8. You can be bowled or caught out, although a butter-fingered fielder may drop the ball. Written for the 16K ZX-81 by Keresley, Coventry.

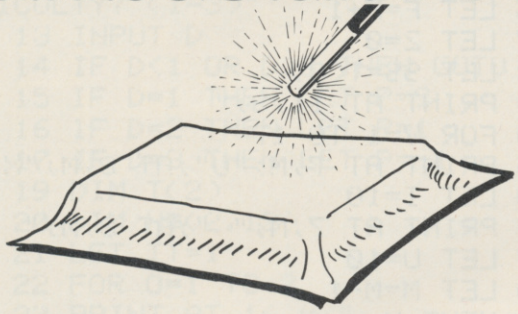
```
   1 REM "CRICKET"
   3 LET F=1
   4 LET Z=0
   5 PRINT AT 0,10;"CRICKET";AT
1,10;"(7*9s)"
   7 PRINT AT 4,0;"7...FOR NEXT
DELIVERY"
   8 PRINT AT 7,0;"5...TO STRIKE
```

```
 BALL ON OFF-SIDE"
   9 PRINT AT 10,0;"8...TO STRIK
E BALL ON ON-SIDE"
  12 PRINT AT 16,0;"LEVEL OF DIF
FICULTY? (1-3)"
  13 INPUT D
  14 IF D<1 OR D>3 THEN GOTO 12
  15 IF D=1 THEN LET P=3
  16 IF D=2 THEN LET P=1
  17 IF D=3 THEN LET P=-1
  19 DIM T(2)
  20 DIM H$(2,12)
  21 LET TT=1
  22 FOR O=1 TO 2
  23 PRINT AT 16,0;"
                "
  25 PRINT AT 16,0;"WHICH TEAM S
DO YOU WANT TO PLAY?"
  26 INPUT H$(O)
  27 NEXT O
  28 LET O=1
  31 IF TT=2 THEN LET O=2
  32 PRINT AT 10,0;"INNINGS OF "
;H$(O)
  40 PAUSE 25
  50 CLS
  65 GOSUB 8505
  72 LET RR=0
  73 LET SS=0
  74 LET W=0
  75 LET R=0
  76 GOTO 4500
  95 LET K=0
 100 LET X=19
 110 LET Y=15
 115 FOR N=1 TO 20
 117 PRINT AT X,Y;"*"
 120 FOR G=1 TO P
 122 NEXT G
 125 PRINT AT X,Y;" "
 127 LET X=X-1
 130 IF N=10 THEN LET O=INT (RND
*5-3)
 135 IF N=10 THEN LET Y=Y+O
 140 IF N<>12 AND INKEY$="0" THE
N LET N=13
 145 IF X<=3 THEN LET X=3
 150 IF N=12 AND Y<=15 AND INKEY
$="5" THEN GOTO 5001
 155 IF N=12 AND Y>=16 AND INKEY
$="8" THEN GOTO 5001
 160 IF Y<=14 AND N=12 AND INKEY
$="8" THEN GOTO 3000
 170 IF Y>=16 AND N=12 AND INKEY
$="5" THEN GOTO 3000
1200 NEXT N
1210 IF Y=8 THEN GOTO 1300
1220 IF Y=8+1 THEN GOTO 1300
1250 GOTO 4500
1300 PRINT AT 13,13;"BOWLED"
1303 GOSUB 8555
1305 PRINT AT 13,13;"       "
1308 GOTO 6095
2000 LET K=INT (RND*2)+1
2010 IF K=1 THEN GOTO 2200
2020 IF K=2 THEN GOTO 2050
2050 GOSUB 8555
2060 PRINT AT 13,13;"DROPPED"
2070 PAUSE 25
2080 PRINT AT 13,13;"       "
2090 GOTO 6095
2200 PRINT AT 13,13;"CAUGHT"
2210 GOSUB 8555
2220 PRINT AT 13,13;"       "
2250 GOTO 6095
3000 PRINT AT 3,15;"*";AT 13,0;"
CAUGHT BEHIND"
3010 GOSUB 8555
3020 PRINT AT 3,15;" ";AT 13,0;"
                "
3035 GOTO 6095
4410 GOTO 4500
4500 PRINT AT 10,8;"  "
4501 LET G$=INKEY$
4505 INPUT G$
4510 IF G$="7" THEN GOTO 85
4520 IF G$<>"7" THEN GOTO 4500
5000 GOTO 4500
5005 LET C=X
5006 LET D=Y
5007 LET S=INT (RND*15)
5008 LET H=INT (RND*4)+1
5015 FOR N=1 TO S
5020 IF H=1 THEN GOTO 5100
5030 IF H=2 THEN GOTO 5110
5040 IF H=3 THEN GOTO 5120
5050 IF H=4 THEN GOTO 5130
5100 LET D=D-1
5102 LET C=C-1
5105 GOTO 6000
5110 LET D=D-1
5112 LET C=C+1
5115 GOTO 6000
5120 LET D=D+1
5122 LET C=C-1
5125 GOTO 6000
5130 LET D=D+1
5135 LET C=C+1
6000 IF C=2 AND D=9 THEN GOTO 20
00
6005 IF C=10 AND D=10 THEN GOTO
2000
6010 IF C=0 AND D=20 THEN GOTO 2
000
6015 IF C=15 AND D=22 THEN GOTO
2000
6040 PRINT AT C,D;"*"
6045 FOR O=1 TO 3
```

```
6046 NEXT O
6047 IF C<=0 THEN LET N=S
6048 IF C>=20 THEN LET N=S
6049 IF D<=0 THEN LET N=S
6050 PRINT AT C,D;" "
6055 GOSUB 8525
6060 NEXT N
6061 IF S>=0 AND S<=3 THEN LET R
=1
6062 IF S>=4 AND S<=7 THEN LET R
=2
6063 IF S>=8 AND S<=10 THEN LET
R=3
6064 IF S>=11 AND S<=12 THEN LET
 R=4
6078 IF S>=14 THEN LET R=6
6082 PRINT AT 10,B;R
6084 PAUSE 10
6086 LET T(O)=T(O)+R
6087 LET Z=Z+R
6088 LET RR=T(O)
6095 PRINT AT 0,1;H$(O)
6096 PRINT AT 1,2;T(O)
6097 PRINT AT 2,1;"FOR"
6098 PRINT AT 3,2;W
6099 PRINT AT 10,0;"NO.";I;AT 11
,3;Z
7000 IF W=10 THEN GOTO 8200
7010 GOSUB 8505
8000 GOTO 4500
8200 CLS
8210 PRINT AT 5,5;"ALL OUT"
8220 PRINT AT 7,5;H$(O);" SCORED
 ";T(O)
8222 IF O=2 THEN GOTO 8630
8250 PRINT AT 10,0;"PRESS ANY KE
Y FOR NEXT INNINGS"
8255 INPUT C
8260 LET TT=2
8300 CLS
8500 GOTO 28
8505 PRINT AT 1,15;"O";AT 2,15;"
A";AT 0,13;"O";AT 1,13;"A"
8510 PRINT AT 4,27;"O";AT 5,27;"
A";AT 17,7;"O";AT 18,7;"A"
8515 PRINT AT 5,5;"O";AT 6,5;"A"
;AT 20,14;"O";AT 21,14;"A"
8520 LET M=17
8521 LET A=5
8522 LET B=15
8525 PRINT AT A,B;"II";AT 21,B;"
II"
8530 PRINT AT 7,M;"O";AT 8,M;"7"
;AT 8,16;"/"
8535 PRINT AT 2,9;"O";AT 3,9;"A"
;AT 10,10;"O";AT 11,10;"A"
8540 PRINT AT 1,11;"O";AT 2,11;"
A"
8545 PRINT AT 0,20;"O";AT 1,20;"
A";AT 15,22;"O";AT 16,22;"A"
8550 RETURN
8569 IF K=2 THEN RETURN
8575 LET W=W+1
8576 LET F=F+1
8577 LET Z=0
8578 LET SS=T(O)
8579 PRINT AT 11,3;"    "
8580 FOR V=1 TO 17
8585 PRINT AT 7,M;"O";AT 8,M;"X"
8600 LET I=10
8605 PRINT AT 7,M;" ";AT 8,M;" "
8607 LET U=10
8610 LET M=M-1
8615 NEXT V
8620 RETURN
8625 STOP
8630 PAUSE 20
8635 CLS
8640 IF T(1)>T(2) THEN GOTO 8650
8642 IF T(1)=T(2) THEN GOTO 8672
8645 IF T(1)<T(2) THEN GOTO 8665
8650 LET U=T(1)-T(2)
8655 PRINT AT 10,0;H$(1);"WINS B
Y ";U;" RUNS"
8660 STOP
8665 LET U=T(2)-T(1)
8670 PRINT AT 10,0;H$(2);"WINS B
Y ";U;" RUNS"
8671 STOP
8672 PRINT AT 10,0;"MATCH DRAWN"
8675 STOP
```



MYSTERY CALCULATOR



WATCH YOUR 16K ZX-81 perform a party trick, courtesy of Carl Johanson of Park North, Swindon. Select any number between one and 63. The computer will then show you six cards with numbers on them. Press Y if your number is on a card, N if not. When you have seen and responded to all six cards the computer will tell you the number of which you thought originally.

```
   5 LET F=0
  10 DIM B(6)
  20 LET Y=1
  30 LET N=0
  40 PRINT ,,"???????mystery cal
culator???????"
  60 PRINT AT 8,0;"  YOU CHOOSE
A NUMBER BETWEEN      1 AND 63.",
,"  THEN A SERIES OF 6 CARDS WIL
L   BE SHOWN IN TURN,YOU ARE THE
N   REQUIRED TO TYPE EITHER YES
OR  NO (Y OR N) DEPENDING ON
    WHETHER YOUR NUMBER APPEARS
OR  NOT."
  70 PRINT ,,,,"I WILL THEN TELL
 YOU YOUR NUMBER"
  80 PRINT AT 20,0;"  Press any
key for first card  "
  90 IF INKEY$="" THEN GOTO 90
 100 CLS
 110 PRINT AT 0,0;"CARD:";1
 120 PRINT AT 7,0;"     1  3  5
 7  9 11 13 15      ",,"    17 19
 21 23 25 27 29 31      ",,"    3
3 35 37 39 41 43 45 47      ",,"
   49 51 53 55 57 59 61 63      "
 130 GOSUB 500
 140 PRINT AT 0,5;2;AT 7,0;"
 2  3  6  7 10 11 14 15      ",,"
    18 19 22 23 26 27 30 31
",,"    34 35 38 39 42 43 46 47
    ",,"    50 51 54 55 58 59 6
2 63      "
 150 GOSUB 550
 160 PRINT AT 0,5;3;AT 7,0;"
 4  5  6  7 12 13 14 15      ",,"
    20 21 22 23 28 29 30 31
",,"    36 37 38 39 44 45 46 47
    ",,"    52 53 54 55 60 61 62
 63      "
 170 GOSUB 550
 180 PRINT AT 0,5;4;AT 7,0;"
 8  9 10 11 12 13 14 15      ",,"
    24 25 26 27 28 29 30 31
",,"    40 41 42 43 44 45 46 47
    ",,"    56 57 58 59 60 61 62
 63      "
 190 GOSUB 550
 200 PRINT AT 0,5;5;AT 7,0;"
16 17 18 19 20 21 22 23      ",,"
    24 25 26 27 28 29 30 31
",,"    48 49 50 51 52 53 54 55
    ",,"    56 57 58 59 60 61 62
 63      "
 210 GOSUB 550
 220 PRINT AT 0,5;6;AT 7,0;"
32 33 34 35 36 37 38 39      ",,"
    40 41 42 43 44 45 46 47
",,"    48 49 50 51 52 53 54 55
    ",,"    56 57 58 59 60 61 62
 63      "
 230 GOSUB 550
 240 CLS
 250 FOR X=1 TO 6
 260 LET F=F+B(X)*2**(X)
 265 PRINT AT 12,0;"      NOW,LET
 ME THINK....."
 267 IF X=4 THEN PRINT AT 16,0;"
     AH,I KNOW NOW."
 270 NEXT X
 280 CLS
 290 PRINT AT 10,0;"    YOUR NUM
BER WAS ";F/2
 300 FOR C=1 TO 20
 310 NEXT C
 320 PRINT AT 21,0;" PRESS ANY K
EY FOR ANOTHER GO "
 330 IF INKEY$="" THEN GOTO 330
 340 CLS
 350 RUN
 500 FOR E=1 TO 6
 510 LET A$=INKEY$
 520 IF A$<>"N" AND A$<>"Y" THEN
 GOTO 510
 530 LET B(E)=VAL A$
 535 IF INKEY$<>"" THEN GOTO 535
 540 RETURN
 550 NEXT E
9998 SAVE "CALC"
9999 RUN
```

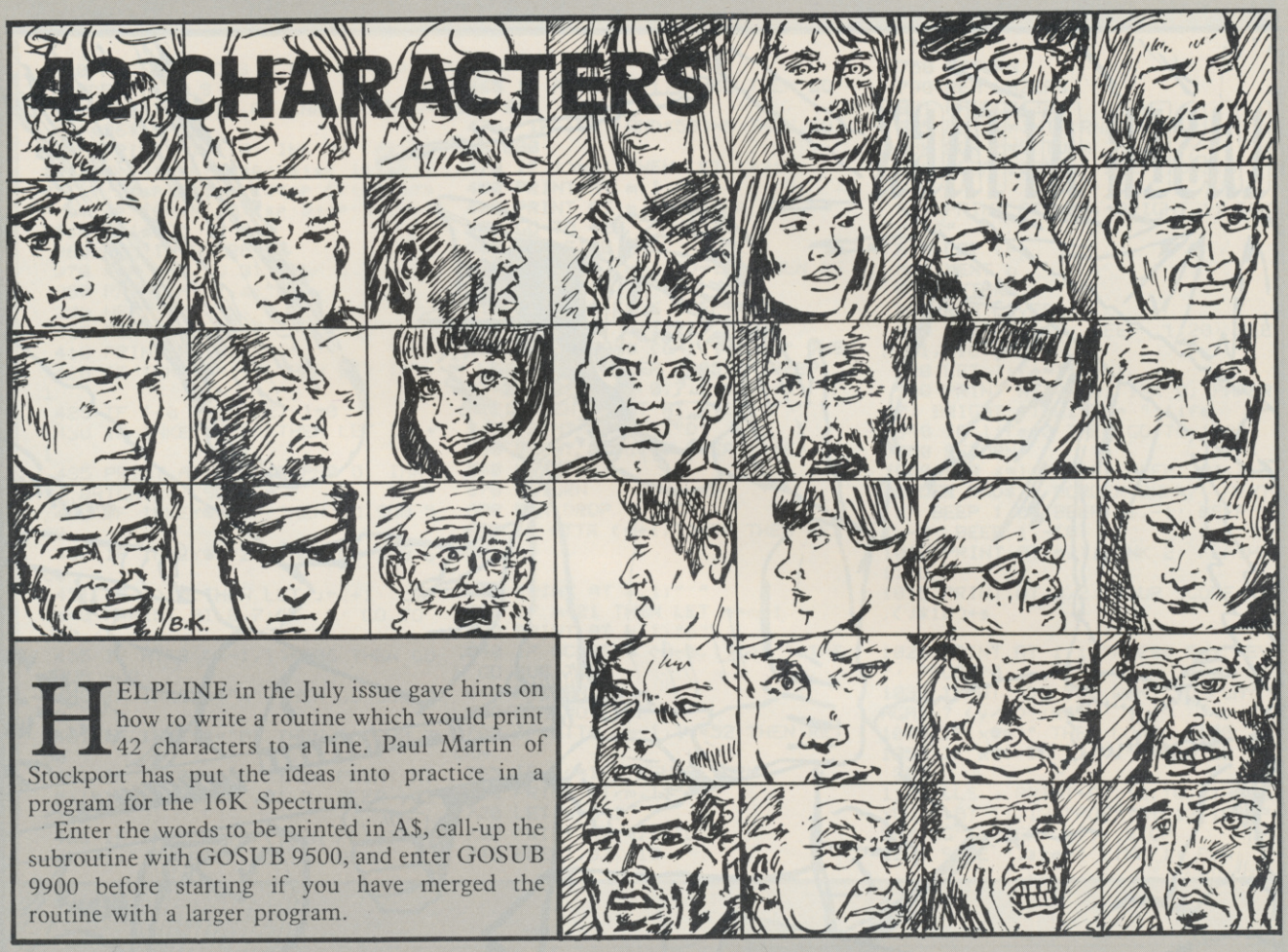
TURPIN

MOVE around the white streams on the screen by using the usual cursor keys. Collect a terrapin (inverse O) and take it to home at the top left of the screen. Can you avoid both the moving crocodile and the rogue terrapins, both of which will kill you? Written for the 16K ZX-81 by Angus Appleby of Arbroath, Angus.

```
  1 REM 0000000
  2 POKE 16514,42
  3 POKE 16515,14
  4 POKE 16516,64
  5 POKE 16517,70
  6 POKE 16518,6
  7 POKE 16519,0
  8 POKE 16520,201
 20 LET S=0
 25 CLS
 30 PRINT "(32*isP)"
 40 FOR N=1 TO 20
 50 PRINT "(isP)";TAB 31;"(isP)
"
 60 NEXT N
```

```
  70 FOR N=1 TO 20 STEP 2
  80~PRINT AT N,0;"(isP:sP:isP:s
P:isP:sP:isP:sP:isP:sP:isP:sP:is
P:sP:isP:sP:isP:sP:isP:sP:isP:sP
:isP:sP:isP:sP:isP:sP:isP:sP:isP
)"
  90 NEXT N
 100 PRINT "(32*isP)"
 110 PRINT "(32*isP)"
 120 PRINT AT 1,1;"(9h)"
 130 LET J=0
 140 LET C=0
 150 FOR N=1 TO 6
 160 PRINT AT INT (RND*19)+1,INT
 (RND*29)+1;"(io)"
 170 NEXT N
 180 LET A=10
 190 LET B=10
 200 LET D=19
 210 LET E=29
 220 LET P=1
 230 LET O=1
 235 PRINT AT 21,0;"scoreL";S
 240 PRINT AT A,B;"*";AT D,E;
 250 LET A$=CHR$ USR 16514
 252 IF A$="(isP)" THEN GOSUB 90
0
 255 PRINT AT D,E;"O"
 260 LET L=A
 270 LET K=B
 280 LET G=D
 290 LET H=E
 310 PRINT AT A,B;" ";AT D,E;A$
 320 LET A=A+(INKEY$="6")-(INKEY
$="7")
 330 LET B=B+(INKEY$="8")-(INKEY
$="5")
 340 PRINT AT A,B;
 350 IF USR 16514<>0 THEN GOSUB
500
 360 LET P=(1 AND D<A)-(1 AND D>
A)
 370 LET O=(1 AND E<B)-(1 AND E>
B)
 380 IF P<>0 AND O<>0 THEN LET O
=0
 390 LET D=D+P
 400 LET E=E+O
 410 IF A=D AND E=B THEN GOTO 70
0
 420 GOTO 240
 500 IF USR 16514=128 THEN GOSUB
 550
 510 IF USR 16514=180 THEN GOSUB
 600
 520 IF USR 16514=136 THEN GOSUB
 1000
 530 RETURN
 550 LET A=L
 560 LET B=K
 570 RETURN
 600 IF C=1 THEN RETURN
 610 IF RND>.7 THEN GOTO 700
 620 LET J=J+1
 630 LET C=1
 640 PRINT AT 1,1;"(9h)"
 650 RETURN
 700 PRINT AT A,B;"(i*)"
 705 FOR N=1 TO 25
 710 PRINT AT 10,13;"deAD"
 720 PRINT AT 10,13;"DEad"
 730 NEXT N
 740 PAUSE 4E4
 750 RUN
 900 LET D=G
 910 LET E=H
 920 LET A$=" "
 930 RETURN
1000 IF C=0 THEN RETURN

1010 LET C=0
1020 LET S=S+10
1030 IF J=4 THEN GOTO 1100
1040 LET A=A+1
1045 LET D=INT (RND*19)+1

1050 LET E=INT (RND*29)+1
1055 PRINT AT 1,1;"(9h)"
1060 GOTO 235
1100 PRINT AT 10,10;"BONUS 1000"
1105 PAUSE 4E4
1110 LET S=S+1000
1120 GOTO 25
9000 SAVE "TURP1n"
9010 RUN
```

42 CHARACTERS



HELPLINE in the July issue gave hints on how to write a routine which would print 42 characters to a line. Paul Martin of Stockport has put the ideas into practice in a program for the 16K Spectrum.

Enter the words to be printed in A$, call-up the subroutine with GOSUB 9500, and enter GOSUB 9900 before starting if you have merged the routine with a larger program.

```
  20 BORDER 0: PAPER 0: INK 7
  40 CLEAR 32569: POKE 23609,100
  60 LET a$="": LET b$="": GO SU
B 9900

 200 PRINT AT 21,0;">This has th
irty two characters."

 220 LET A$="This has forty two
characters Per line!!!!"

 240 GO SUB 9500
 260 LET a$="And also the subrou
tine Prevents words overlaPPing!
"

 280 PRINT ''a$: GO SUB 9500
 300 STOP
9500 REM 42 to a line
9520 POKE 23692,255: PRINT
9540 IF LEN A$>42 THEN GO SUB 98
00

9560 IF LEN A$<42 THEN LET A$=A$
+" ": GO TO 9560
9580 FOR A=1 TO 41

9600 PRINT AT 21,31; OVER 1;A$(A
)
9620 FOR B=1 TO 6
9640 RANDOMIZE USR 32570
9660 NEXT B: NEXT A
9670 PRINT AT 21,31;a$(42): RAND
OMIZE USR 32570

9680 IF B$="" THEN RETURN
9700 LET A$=B$: LET b$=""
9720 GO SUB 9520: RETURN
9800 REM a$>42

9820 IF LEN A$>86 THEN STOP
9840 IF A$(43)=" " THEN LET B$=A
$(44 TO ): LET A$=A$( TO 43): RE
TURN

9860 FOR C=43 TO 30 STEP -1
9880 IF A$(C)=" " THEN LET B$=A$
(C+1 TO ): LET A$=A$( TO C): RET
URN

9890 NEXT C: STOP
9900 RESTORE : REM M/C SCROLL

9920 FOR A=32570 TO 32598
9940 READ B: POKE A,B: NEXT A
9960 RETURN

9980 DATA 33,191,80,14,8,175,229
,17,31,0,237,82,126,25,23,6,32,1
26,23,119,43,16,250,225,36,13,32
,233,201
```

LASER ATTACK

THE space invaders above you drop laser bars which you cannot pass. By blasting the ground beneath them you weaken their foundation and can then blast away the bottom of a bar. Once that has been done they can be destroyed if you stand beneath them and fire upwards. You will suffocate if a laser bar or the earth is directly above you. Move left with 1, right with 0, up with 2, and down with m. Blast left with 3, right with 8 and upwards with 9. Your aim is to survive for as long as possible, gaining points by shooting invaders and laser bars.

Written for the 16K Spectrum by Alexander McKehnie of Harpenden, Herts.

```
  30 PRINT AT 10,10;"LAZER BARS"
  31 PAUSE 20: CLS : PRINT AT 1,
1;"THE AIM OF THIS GAME IS TO SH
OUT AS MANY INVADERS AS POSSIBLE
. UNFORTUNATELY,TO DO SO YOU MUS
T BURROW UNDER LAZERS WHICH THE
INVADERS DROP."
  32 PRINT " IF YOU ARE LOW ENOU
GH YOU CAN GAIN EXTRA POINTS BY
SHOOTING A LASER."
  33 PRINT " YOU HAVE GOT THREE
LIVES. PRESS ANY KEY": PAUSE 0:
BEEP .1,40
  34 CLS : PRINT "YOU WILL HEAR
THIS NOISE WHEN YOU ARE LOSING A
 LIFE - Press a key": PAUSE 0: B
EEP .1,10: BEEP .1,20: BEEP .1,-
10
  35 CLS
  40 PRINT TAB (10);"CONTROLS"
  50  PRINT AT 1,1;"1 - to move
left";AT 3,1;"0 - to move right"
;AT 5,1;"9 - to fire "
  60 PRINT AT 7,1;"2 - to drop d
own";AT 9,1;"m - to jump up"
  70 PRINT AT 11,1;"3 - to blast
 left";AT 13,1;"8 - to blast rig
ht"
  80 PRINT AT 15,2;"If you are s
itting directly beneath somethin
g, such as land, or a laser,you
lose your lives."
  90 PRINT AT 19,0;"To gain a ho
le beneath you,you must kill an
invader above you"
  95 PRINT AT 20,29;".Itwill bec
ome clearer as you play."
  99 PRINT AT 2,18; INK 1; PAPER
 2;"Press any key": PAUSE 0
 100 REM GRAPHICS
 110 REM *GRAPHIC B FOR INVADER
 120 FOR a=0 TO 7

 130 READ x
 131 POKE USR "B"+a,x
 135 NEXT a
 140 DATA 126,90,60,126,90,66,66
,129
 141 REM *GRAPHIC D FOR LASER BA
SE
 142 FOR a=0 TO 7
 143 READ x
 144 POKE USR "D"+a,x
 145 NEXT a
 146 DATA 36,66,153,153,90,126,1
89,255
 150 REM *GRAPHIC C FOR LASER
 160 FOR a=0 TO 7
 170 POKE USR "C"+a,BIN 00011000
 180 NEXT a
 260 REM *GRAPHIC E FOR FIRE
 270 FOR a=0 TO 7
 280 POKE USR "E"+a,BIN 00010100
 290 NEXT a

 300 REM VARIABLES
 310 LET j=0: LET l=10: LET m=18
  LET life=3
 320 LET life=3: LET s=0: LET k=
0
```

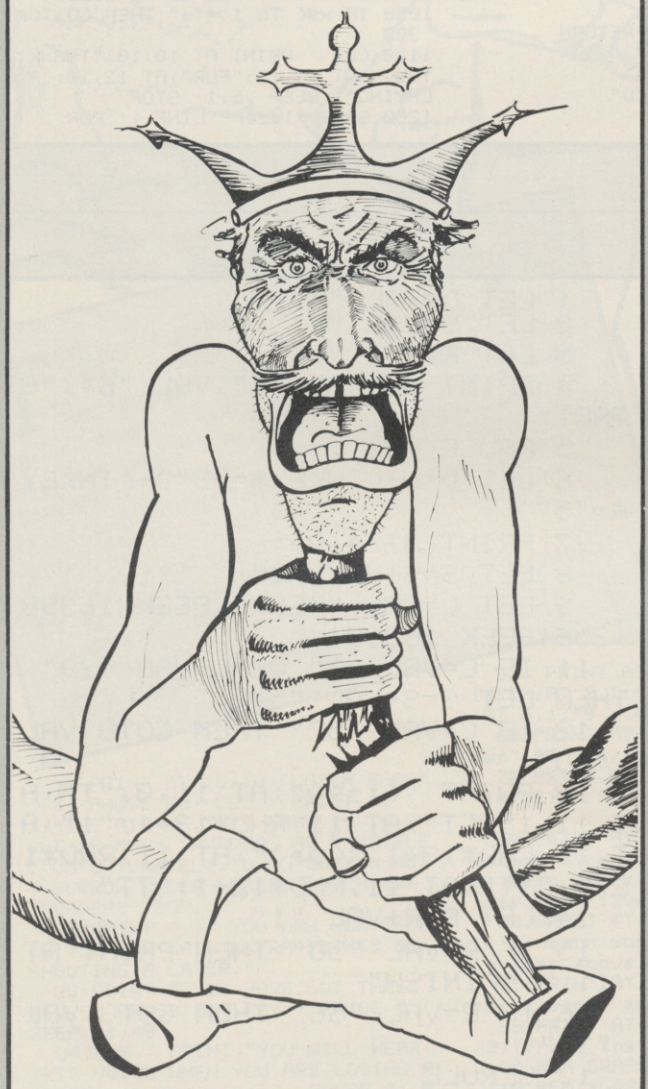
```
330 PAPER 5: CLS : INK 0: CLS :
BORDER 1: CLS
340 PRINT AT 19,0; INK 4; PAPER
6;"(96*isP)"
350 PRINT AT 1,0; INK 7;"(8*isP
:21*sP:14*isP:6*sP:3*isP:11*sP:1
0*isP:7*sP:6*isP:13*sP:6*isP:6*s
P:5*isP:10*sP:10*isP:9*sP:4*isP:
7*sP:2*isP)"
360 REM INVADERS
370 FOR a=0 TO 31 STEP 2
380 PRINT AT 7,a;"B"
390 NEXT a
400 REM MOVE BASE
410 PRINT AT m,l;"D"
420 IF INKEY$="1" THEN LET l=l-
1
425 IF l<0 THEN LET l=0
430 IF INKEY$="0" THEN LET l=l+
1
435 PRINT AT 0,0; PAPER 0; INK
7; BRIGHT 1;"SCORE= "
440 IF INKEY$="9" THEN GO SUB 5
00
450 IF INKEY$="2" THEN GO SUB 6
00
451 IF s>15 THEN LET j=j+1: LET
s=0: PRINT AT 0,7;"  ": GO TO
360
455 IF ATTR (m-1,l)=106 THEN GO
SUB 900
460 IF INKEY$="m" THEN GO SUB 7
00
461 IF INKEY$="M" THEN GO SUB 7
00
462 IF INKEY$="3" THEN PRINT AT
m,l-1;" ": BEEP .01,0: BEEP .01
,-10
463 IF INKEY$="8" THEN PRINT AT
m,l+1;" ": BEEP .01,0: BEEP .01
,-10
465 IF ATTR (m-1,l)=52 THEN GO
SUB 900
470  IF INT (RND*50)=5 THEN GO
SUB 800
479 IF l>=31 THEN LET l=31
480 PRINT AT m,l;"D"
485 PRINT AT m,l; PAPER 5;" "
490 GO TO 420
500 REM FIRE
505 IF ATTR (m-1,l)=106 THEN RE
TURN
510 FOR u=m TO 6 STEP -1
520 PRINT AT u,l;"E"
530 IF SCREEN$ (u-1,l)<>" " THE
N LET s=s+1: BEEP .005,4: BEEP .
02,-2: PRINT AT 0,7;(16*j)+s: IF
m<21 THEN PRINT AT m+1,l;" "
540 PRINT AT m,l;"D"
550 PRINT AT u,l; OVER 1;"E"
560 NEXT u
570 RETURN
600 REM DROP
605 IF ATTR (m+1,l)=52 THEN RET
URN

610 PRINT AT m,l;" "
620 IF m<21 THEN LET m=m+1
630 PRINT AT m,l;"D"
640 IF SCREEN$ (m-1,l)<>" " THE
N GO SUB 700
645 RETURN
690 REM MOVE UP
700 IF ATTR (m-1,l)=52 THEN RET
URN
705 IF m<=18 THEN RETURN
710 PRINT AT m,l;" "
720 LET m=m-1
730 PRINT AT m,l;"D"
740 BEEP .02,-10
750 RETURN
790 REM LAZERS
801 RANDOMIZE
805 LET t=INT (RND*31)
808 FOR o=8 TO m
809 BEEP .005,m: BEEP .005,0

810 PRINT AT o,t; BRIGHT 1; INK
2;"C"
815 LET t=t
820 NEXT o
830 RETURN
900 REM LIVES
910 BEEP .1,10: BEEP .1,20: BEE
P .1,-10
920 LET life=life-1
930 PRINT AT 0,10; INK 0; PAPER
7; BRIGHT 1;"LIVES= ";life
940 IF life=0 THEN GO TO 1000
950 RETURN
1000 FOR a=1 TO 10: BEEP .01,a:
BORDER RND*7: BORDER RND*7: NEXT
a: BEEP 1,0: BEEP .1,-1: BEEP .
1,-2: BEEP 1,-10
1010 PRINT AT m,l; INK 2; FLASH
1;"D"
1015 PRINT AT 9,2;"YOUR SCORE: "
,(j*16)+s

1020 PRINT AT 1,1;"PRESS ANY KEY
": PAUSE 0
1030 INPUT "DO YOU WANT TO PLAY
AGAIN? (y/n)";x$
1040 IF x$="" THEN GO TO 1100
1050 IF x$( TO 1)="y" THEN GO TO
 300
1100 CLS : PRINT AT 10,10;"THANK
YOU ";AT 11,13;"FOR";AT 12,10;"P
LAYING": BEEP .5,1: STOP
1200 SAVE "lazer" LINE 1: RUN
```

YOUR skier moves steadily down the screen, moving left when 5 is pressed and right when 8 is pressed. Trees are represented by T, and hitting them means instant death. Posts are represented by 1 and bushes by graphic A. Hitting a post or a bush means the loss of five points. You gain one point for each move and the maximum number of points to be scored between Start and Finish is 56.

Ski Slope was written by R Wooberry for the 1K ZX-81.

```
  1 LET D=VAL "7"
  2 LET S=VAL "0"
  3 LET R=VAL "0"
  4 PRINT AT VAL "3",VAL "6";"S
TART"
  5 PAUSE 100
  6 LET D=D+(INKEY$="8")-(INKEY
$="5")
  7 PRINT AT 4,D;
  8 LET S=S+VAL "1"
  9 LET C=VAL "PEEK (PEEK 16398
+256*PEEK 16399)"
 11 IF C=VAL "8" OR C=VAL "29"
THEN LET S=S-VAL "5"
 12 IF C=VAL "57" THEN GOTO VAL
 "20"
 13 PRINT "(isP)";AT 11,0;"T";A
T 11,15;"T";AT 11,RND*13+1;"1";A
T 11,RND*13+1;"(9a)";AT 11,RND*1
2+1;"TT";AT 11,RND*12+1;"TT"
 14 LET R=R+VAL "1"
 15 IF R=VAL "50" THEN PRINT AT
 11,5;"FINISH"
 16 IF R=VAL "56" THEN GOTO VAL
 "21"
 17 SCROLL
 18 GOTO VAL "6"
 20 PRINT "CRASH"
 21 PRINT S
```

ATTA



YOU appear at the left of the screen, able to move up and down. Aliens appear on the right of the screen to be shot down by pressing '8'.

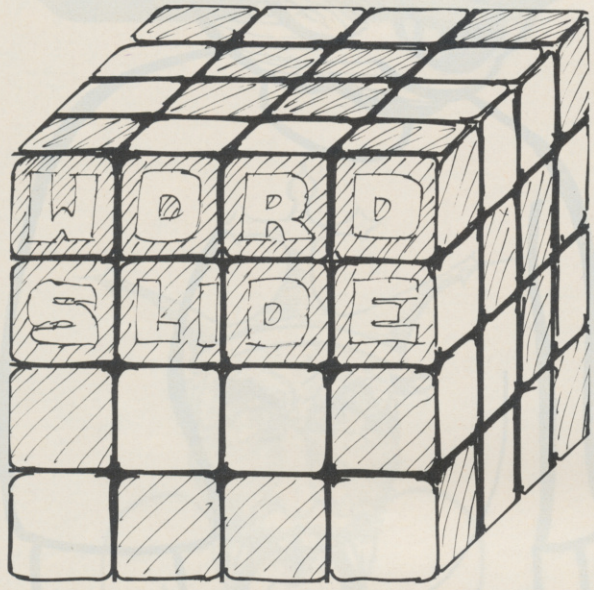
David Hookham of Barwell, Leicestershire has cleverly altered the x co-ordinate in lines 100 and 110 by four each time, thus allowing extremely fast movement. (16K ZX-81)

```
  40 GO SUB 9000: LET hi=0
  50 GO SUB 8000: GO SUB 7000
  60 FOR w=28 TO d STEP -1
  70 PRINT AT s,w; INK 4;"B "
  80 PRINT AT p,5; INK 6;"A"
  90 LET x=0

 100 IF INKEY$="7" THEN LET x=-4
 110 IF INKEY$="6" THEN LET x=4
 120 IF INKEY$="8" AND p=s THEN
GO TO 1000

 130 IF p+x<=3 THEN LET x=0
 140 PRINT AT p,5;" "
 150 LET p=p+x: IF p>16 THEN LET
 p=16

 160 NEXT w
 170 LET lives=lives+1
 180 IF lives=5 THEN GO TO 2000
 190 LET s=INT (RND*4)*4+4
 200 IF s>=16 THEN LET s=4
 210 GO TO 60
1000 PRINT AT s,w;"  "
1010 LET sc=sc+10
1020 IF sc>10 THEN LET d=d+2
1030 GO TO 190
2000 PRINT AT 3,2;"SCORE = ";sc


2010 IF hi<sc THEN LET hi=sc
```

ACK

```
2020 PRINT AT 5,2;"HIGH = ";hi
2030 INPUT "Press ENTER to play
a9ain "; LINE z$

2040 GO TO 50
7000 BORDER 1: PAPER 1: INK 9: B
RIGHT 1: CLS
7010 PRINT AT 1,13;"Attack": PLO
T 100,159: DRAW 52,0
7020 PRINT AT 4,3;"This is the 9
ame of ATTACK. "'" You must st
oP the aliens from"'" invadin9

 your aerospace. You"'" move u
p and down with the ~7~"'" and
 ~6~ keys. You fire with"'" th
e ~8~ key. You have 5 lives"'"

 and the aliens will not "'" 9
ive uP!"
7030 PRINT AT 18,16;"You > A ";A
T 20,16;"Him > B ": PRINT AT 21,
3;"GOOD LUCK!"
7040 PRINT £1;"   Press any key
to continue"
7050 PAUSE 0
7060 BORDER 0: PAPER 0: INK 7: C
LS : RETURN
8000 LET sc=0: LET p=4: LET d=1
8010 LET lives=0: LET s=4: LET 9
=1
8020 RETURN
9000 FOR a=1 TO 2: READ a$
9010 FOR n=0 TO 7: READ b
9020 POKE USR a$+n,b: NEXT n
9030 NEXT a: RETURN
9040 DATA "A",192,176,76,35,35,7
6,176,192
9050 DATA "B",60,90,126,60,24,36
,90,0
```

WORD SLIDE



FIFTEEN letters appear in a four-by-four box. By sliding one of the letters adjoining the empty space into the space and repeating the process, try to arrange the letters into alphabetical order. To move a letter press the corresponding key.

Word Slide was written by Timothy Skinner of Hoveton, Norfolk for the 16K ZX-81.

```
  10 DIM A$(4,4)
  20 LET A$(1)="ABCD"
  30 LET A$(2)="EFGH"
  40 LET A$(3)="IJKL"
  45 LET A$(4)="MNO "
  46 GOSUB 600
  61 PRINT AT 0,0;,"(93*4$96*94)
"
  62 FOR N=1 TO 4
  63 PRINT ,"(98)";A$(N);"(95)"
  64 NEXT N
  65 PRINT ,"(92*4$97*91)"
  70 PRINT "INPUT LETTER"
  80 INPUT B$
  90 FOR N=1 TO 4
 100 FOR M=1 TO 4
 110 IF A$(N,M)=B$ THEN GOTO 150
 120 NEXT M
 130 NEXT N
 140 GOTO 80
 150 IF (N=X OR N=X+1 OR N=X-1)
AND (M=Y OR M=Y+1 OR M=Y-1) THEN
 GOTO 170
 160 GOTO 80
 170 LET A$(X,Y)=A$(N,M)
 180 LET A$(N,M)=" "
 190 LET X=N
 195 LET Y=M
 200 GOTO 61
 600 FAST
 610 FOR N=1 TO 20
 620 LET Q=INT (RND*4)+1
 630 LET T=INT (RND*4)+1
 631 LET P=INT (RND*4)+1
 632 LET L=INT (RND*4)+1
 640 LET T$=A$(Q,T)
 645 LET A$(Q,T)=A$(P,L)
 650 LET A$(P,L)=T$
 660 NEXT N
 661 FOR N=1 TO 4
 662 FOR M=1 TO 4
 663 IF A$(N,M)=" " THEN GOTO 67
1
 664 NEXT M
 665 NEXT N
 671 LET X=N
 672 LET Y=M
 673 SLOW
 680 RETURN
 700 SAVE "PUZZLe"
 710 RUN
```

SOME LOGO

DAVID BYE of Saffron Waldon, Essex has written a version of the language LOGO for the 48K Spectrum. Commands should be entered as two letters and then a positive or negative number. In the instructions given the number is represented by an "n" in brackets.

Drawing commands:

rl (n) draws right to left

rl (-n) draws left to right

ud (n) draws vertically up

ud (-n) draws vertically down

du (n) draws diagonally up and right

du (-n) draws diagonally up and left

dd (n) draws diagonally down and right

dd (-n) draws diagonally down and left

Cursor commands:

ca (n) moves cursor right

ca (-n) moves cursor left

cu (n) moves cursor up

cu (-n) moves cursor down

Utility commands:

st stops the program or a repeat

hm homes the cursor

cs clears the screen, retaining the stream

rs re-sets

rp enables repeat

ru erases last command

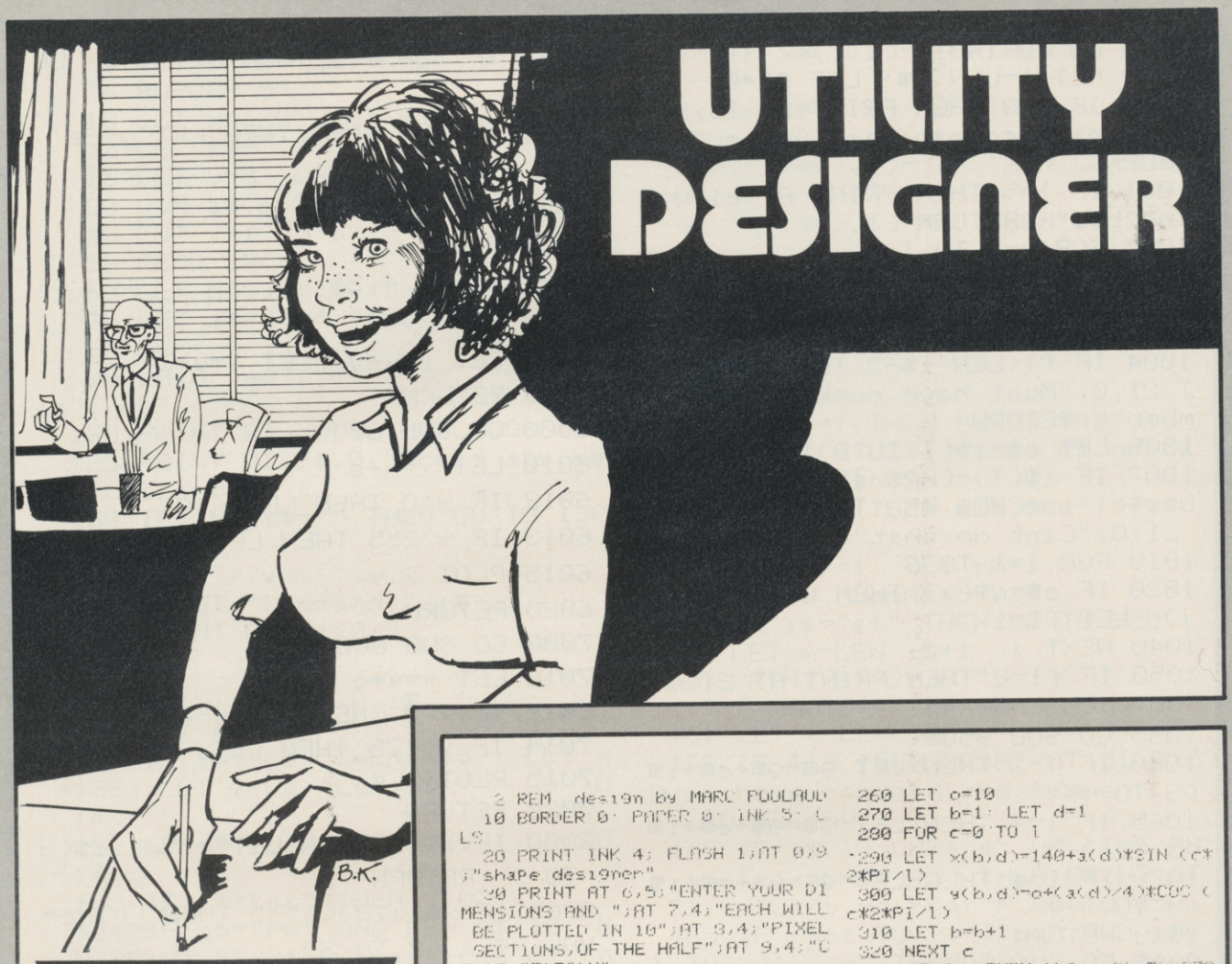
```
  5 LET ff=0: LET m=0
  6 BORDER 5
 10 LET x=120: LET y=80
 12 LET g$=""
 15 LET w=0: LET v=0
 20 DIM a$(6,2): DIM d$(6,2)
 40 FOR j=1 TO 6
 50 READ a$(j)
 60 LET d$(j)=a$(j)
 70 LET a$(j)=" "+STR$ j
 80 NEXT j
 90 DATA "ud","rl","dd","du","ca","cu"
120 PRINT AT 8,12;"COMLOGS"
125 PRINT AT 21,0;"Press any key to start"
130 IF INKEY$="" THEN GO TO 130
135 CLS
140 PLOT x,y
142 INPUT "Command ",i$
145 PRINT AT 21,0;"
                   "
146 PRINT AT 21,0;i$
147 LET f9=0
150 IF i$="rs" THEN CLS : LET x=120: LET y=80: LET g$="": GO TO 140
152 IF i$="cs" THEN CLS : GO TO 140
153 IF i$="st" THEN STOP
154 IF i$="ru" AND LEN g$<10 THEN PRINT AT 21,0;"Cant rub out now": GO TO 140
155 IF i$="ru" THEN LET g$=g$(TO (LEN g$-2))+"  ": LET f9=1: LET fh=1: LET fj=1: CLS : GO TO 200
157 LET fj=0
160 IF i$="rp" THEN LET f9=1: LET fh=0: GO TO 200
165 IF i$="hm" THEN LET x=120: LET y=80: GO TO 140
170 GO SUB 999
180 GO TO 140
200 LET l=LEN g$
210 IF l<5 THEN PRINT AT 21,0;"That wont work": GO TO 140
215 IF fh=0 THEN GO TO 440
220 DIM x$(l,4)
230 FOR j=1 TO l
240 IF g$(j)=" " THEN GO TO 280
245 IF x$(j-1)=" " AND x$(j+1)=" " THEN GO TO 280
250 IF g$(j-1)=" " THEN LET x$(j)=g$(j TO (j+2))
280 NEXT j
290 FOR j=1 TO l
300 IF x$(j,1)=" " THEN GO TO 370
310 IF x$(j,1)="1" THEN GO SUB 2000
320 IF x$(j,1)="2" THEN GO SUB 3000
330 IF x$(j,1)="3" THEN GO SUB 4000
340 IF x$(j,1)="4" THEN GO SUB 5000
350 IF x$(j,1)="5" THEN GO SUB 6000
360 IF x$(j,1)="6" THEN GO SUB 7000
370 NEXT j
380 IF fj=1 THEN GO TO 140
440 PRINT AT 21,0;"Use ca or cu to move cursor      "
444 IF ff=1 THEN LET g$=" "+g$(m TO )
445 LET ff=1: LET fh=1
450 INPUT "Command",i$
455 IF i$="st" THEN GO TO 950
457 LET m=LEN i$+1
460 PRINT AT 21,0;"
                   "
461 LET l=LEN i$
462 IF l<3 THEN PRINT AT 21,0;"Must have command and number": GO TO 450
463 IF i$(1)=CHR$ 45 OR (l=5 AND i$(l-1)=CHR$ 45) THEN PRINT AT 21,0;"Cant do that": GO TO 450
465 IF i$(1 TO 2)<>"ca" AND i$(1 TO 2)<>"cu" THEN PRINT AT 21,0;"Cursor controls only, Please": GO TO 450
470 IF l>5 THEN PRINT AT 21,0;"Too big": GO TO 450
475 LET f1=0
480 FOR j=3 TO l
490 IF (i$(j)>CHR$ 47 AND i$(j)<CHR$ 58) OR i$(j)=CHR$ 45 THEN LET f1=f1+1
500 NEXT j
510 IF f1<l-2 THEN PRINT AT 21,0;"You must give command and number": GO TO 450
520 IF i$(1 TO 2)="ca" THEN LET h$=" 5"+i$(3 TO )
530 IF i$(1 TO 2)="cu" THEN LET h$=" 6"+i$(3 TO )
540 LET g$=h$+"  "+g$
550 GO TO 200
950 PRINT AT 21,0;"Press C to go on,or F to finish "
952 IF INKEY$<>"c" AND INKEY$<>"f" THEN GO TO 952
960 IF INKEY$="f" THEN STOP
962 IF ff=1 THEN LET g$="  "+g$(6 TO )
965 LET ff=0
```

Continued over

Continued from page 76

```
 970 GO TO 140
 999 LET l=LEN i$: LET f1=0
1000 IF l<3 THEN PRINT AT 21,0;"
Must have command and number": R
ETURN
1001 IF l>5 THEN PRINT AT 21,0;"
Too big": RETURN
1002 FOR j=3 TO l
1003 IF (i$(j)> CHR$ 47 AND i$(j
)<CHR$ 58) OR i$(j)=CHR$ 45 THEN
 LET f1=f1+1: NEXT j
1004 IF f1<LEN i$-2 THEN PRINT A
T 21,0;"Must have command and nu
mber": RETURN
1005 LET e$=i$(1 TO 2): LET f1=0
1007 IF i$(l)=CHR$ 45 OR (l=5 AN
D i$(l-1)=CHR$ 45) THEN PRINT AT
 21,0;"Cant do that": RETURN
1010 FOR j=1 TO 6
1020 IF e$=d$(j) THEN LET e$=a$(
j): LET f1=1
1040 NEXT j
1050 IF f1=0 THEN PRINT AT 21,0;
"No such command": RETURN
1055 GO SUB 9500
1060 IF l=3 THEN LET g$=g$+e$+i$
(3 TO )+"   "
1065 IF l=4 THEN LET g$=g$+e$+i$
(3 TO )+"   "
1070 IF l>4 THEN LET g$=g$+e$+i$
(3 TO )+"  "
1080 RETURN
2000 GO SUB 8000
2010 LET w=e: LET v=0
2012 GO SUB 9000
2015 PLOT x,y
2017 BEEP .4,22
2020 DRAW v,w
2025 LET y=y+w
2030 RETURN
3000 GO SUB 8000
3010 LET v=e: LET w=0
3012 GO SUB 9000
3015 PLOT x,y
3017 BEEP .4,20
3020 DRAW v,w
3025 LET x=x+v
3030 RETURN
4000 GO SUB 8000
4020 IF  SGN e=1 THEN LET v=e: L
ET w=-e
4030 IF SGN e=-1 THEN LET w=e: L
ET v=e
4032 GO SUB 9000
4035 PLOT x,y
4037 BEEP .4,19
4040 DRAW v,w
4045 LET x=x+v: LET y=y+w
4050 RETURN
5000 GO SUB 8000
5020 IF SGN e=1 THEN LET v=e: LE
T w=e
5030 IF SGN e=-1 THEN LET w=-e:
LET v=e
5032 GO SUB 9000
5035 PLOT x,y
5037 BEEP .4,21
5040 DRAW v,w
5045 LET x=x+v: LET y=y+w
5050 RETURN
6000 GO SUB 8000
6010 LET x=x+e
6012 IF x<0 THEN LET x=0
6013 IF x>255 THEN LET x=255
6015 PLOT x,y
6020 RETURN
7000 GO SUB 8000
7010 LET y=y+e
7012 IF y<0 THEN LET y=0
7014 IF y>175 THEN LET y=175
7015 PLOT x,y
7020 RETURN
8000 IF f9=0 THEN LET e=VAL i$(3
 TO ): RETURN
8005 IF x$(j,3)<>" " THEN LET e=
VAL x$(j)(2 TO 3)
8010 IF x$(j,4)<>" " THEN LET e=
VAL x$(j)(2 TO 4)
8020 IF x$(j)(3)=" " THEN LET e=
VAL x$(j)(2)
8050 RETURN
9000 IF x+v<0 THEN LET v=-x
9040 IF x+v>255 THEN LET v=255-x
9050 IF y+w<0 THEN LET w=-y
9060 IF y+w>175 THEN LET w=175-y
9000 RETURN
9500 IF e$(2)="1" THEN GO SUB 20
00
9520 IF e$(2)="2" THEN GO SUB 30
00
9530 IF e$(2)="3" THEN GO SUB 40
00
9540 IF e$(2)="4" THEN GO SUB 50
00
9550 IF e$(2)="5" THEN GO SUB 60
00
9560 IF e$(2)="6" THEN GO SUB 70
00
9570 RETURN
```

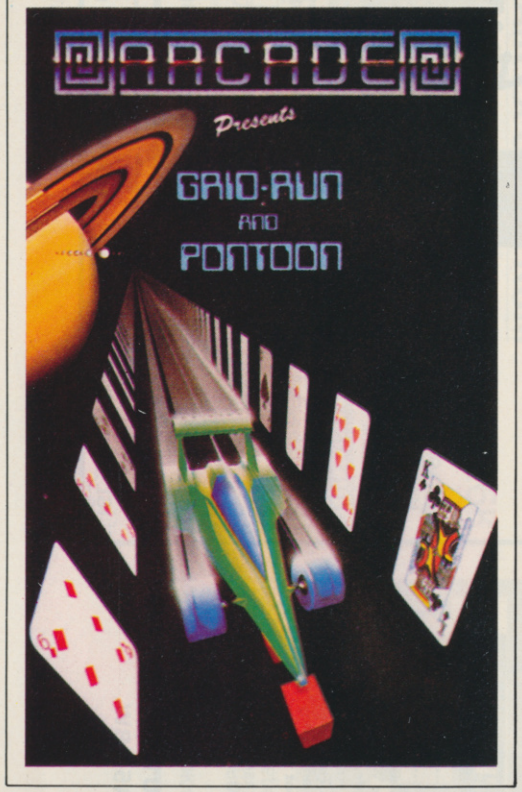
UTILITY DESIGNER



MARC POULAUD of York wrote **Utility Designer** for the 16K Spectrum, allowing a user to design large three-dimensional objects. The objects can have from three to 13 sides, or be round. Type-in the horizontal radii of the half cross-section, which go up automatically in 10-pixel sections. After a pause a 3D representation of the object will be drawn.

```
  2 REM  design by MARC POULAUD
  10 BORDER 0: PAPER 0: INK 5: C
LS
  20 PRINT INK 4; FLASH 1;AT 0,9
;"shape designer"
  30 PRINT AT 6,5;"ENTER YOUR DI
MENSIONS AND ";AT 7,4;"EACH WILL
 BE PLOTTED IN 10";AT 8,4;"PIXEL
 SECTIONS,OF THE HALF";AT 9,4;"C
ROSS SECTION"
  40 PRINT AT 13,5;"PRESS ANY KE
Y TO CONTINUE"
  50 PAUSE 0
  60 CLS
  70 PRINT AT 0,7;"HOW HIGH (max
-14)"
  80 INPUT x
  90 IF x>14 OR x<1 THEN GO TO 8
0
 100  PRINT AT 2,2;"IF YOU WANT
A SPECIFIC NUMBER";AT 3,1;"OF SI
DES ENTER THAT NUMBER OF";AT 4,1
;"SIDES OR IF JUST CIRCULAR ENTE
R '14'": INPUT l: IF l<3 OR l>14
 THEN GO TO 100
 110 CLS
 120 DIM a(16): DIM x(15,x): DIM
 y(15,x): LET c=-10
 130 PLOT INK 2;0,0: DRAW 0,(x*1
0)-10: PLOT 0,0
 140 BRIGHT 1
 150 FOR a=1 TO x
 160 INPUT b
 170 LET a(a)=b
 180 IF a(1)>70 THEN GO TO 160
 190 IF a(a)>120 THEN GO TO 160
 195 IF a(14)>80 THEN GO TO 160
 200 DRAW b-PEEK 23677,10+c-PEEK
 23678
 210 DRAW 0-PEEK 23677,10+c-PEEK
 23678
 220 DRAW b-PEEK 23677,10+c-PEEK
 23678
 230 LET c=c+10
 240 NEXT a
 250 PRINT AT 0,1;"PLEASE WAIT W
HILE I COMPUTE.";AT 1,2;"THIS IS
 TO ENSURE MAXIMUM";AT 2,9;"DRAW
ING SPEED"
 260 LET o=10
 270 LET b=1: LET d=1
 280 FOR c=0 TO l
 290 LET x(b,d)=140+a(d)*SIN (c*
2*PI/l)
 300 LET y(b,d)=o+(a(d)/4)*COS (
c*2*PI/l)
 310 LET b=b+1
 320 NEXT c
 330 IF d=x THEN CLS : GO TO 370
 340 LET d=d+1: LET b=1: LET o=o
+10
 350 GO TO 200
 360 IF INKEY$="Y" THEN CLS : GO
 TO 370
 370 LET a=10
 380 LET b=1: LET d=1
 390 FOR c=0 TO l
 400 IF c=0 THEN PLOT x(b,d)-20,
y(b,d)+14
 410 DRAW x(b,d)-20-PEEK 23677,y
(b,d)+14-PEEK 23678
 420 IF d>1 THEN DRAW x(b,d-1)-2
0-PEEK 23677,y(b,d-1)+14-PEEK 23
678: DRAW x(b,d)-20-PEEK 23677,y
(b,d)+14-PEEK 23678
 430 LET b=b+1
 440 NEXT c
 450 IF d=x THEN GO TO 480
 460 LET d=d+1: LET b=1: LET o=o
+10
 470 GO TO 390
 480 PRINT AT 0,0;"PRESS";AT 1,0
;"ANY";AT 2,0;"KEY";AT 3,0;"TO";
AT 4,0;"CONT."
 490 PAUSE 0
 500 CLS
 510 PRINT INK 2;"      NEW ONE
?"
 520 PAUSE 0: CLS
 540 IF INKEY$="y" THEN GO TO 70
 550 PRINT INK 2;AT 5,0;"      T
HE SAME ONE ?"
 560 PAUSE 0
 570 IF INKEY$="y" THEN CLS : GO
 TO 370
 580 CLS : PRINT INK 2;AT 10,0;"
      BYE !"
```

THE ARCADE COLLECTION

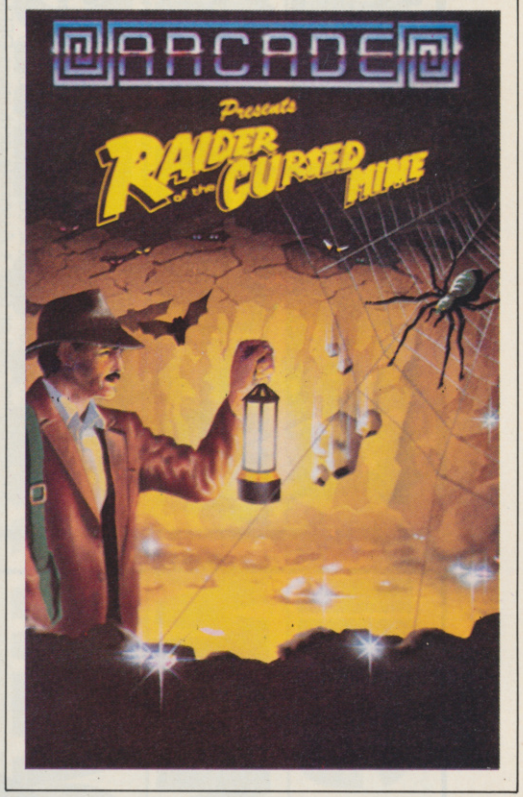


GRID RUN is a high resolution, fast machine code game using the spectrums sound and colour to the full. Set in a maze you must avoid oncoming android cars bent on your destruction. Bonus car every 10,000 points "Famous Five" hall of fame, increasing speed and difficulty. There is even a hold button to get your breath back.

PONTOON included on side B absolutely free. Pontoon has full graphical representations of all the cards including King, Queen, Jack, "Intelligent" play of aces, and full analysis of results at end of each game. REF. GRID.

LAST SUNSET FOR LATTICA (Original) is a true graphical adventure game in real time. Your aim is to defuse a bomb hidden somewhere in a highly complicated maze avoiding many well armed androids along the way. Extra lives are there for the taking, so are the keys to take you to the next level and all the while time is running out for the little Planet of Lattica. REF. SUN.

THE DETECTIVE (Original) You thought it was just another "Take the secrets from a Safe and Run" job but the mob thought differently. They will try everything to stop you this time, if madmen, lasers, bombs, dynamite, daggers, barrels, blister bombs, crates, helicopters, jets and fourteen other levels do not get you, you might just make it. Opening the safe has its pitfalls too. Fast moving, m/c game with excellent graphics and sound. A very addictive game. REF. DET.



RAIDER OF THE CURSED MINE (Original) Greed drove you down into the old diamond mine, sheer determination and luck is the only way out again. Lifts help you, so do lamps, and diamonds can be worth a fortune but beware of the evils that lurk deep in the mine. Trolls who throw boulders at you, spiders who eat you, ghosts who show no mercy and bats who steal things, add to this a time bonus and you have an exciting Arcade quality game. Reach level 32 and escape to the big outside world. REF. RAID.

All these games are available for the ZX Spectrum 48K for the incredible price of only **£5.50** including P&P VAT etc. Just complete the mail order form for prompt dispatch by return of post.

Arcade are committed to original game concepts so look out for new titles in the Arcade range. Trade enquiries welcome. Phone Orpington 35639 anytime or write to Arcade Software Ltd, Technology House, 32 Chislehurst Road, Orpington, Kent BR6 0DG.

TO: ALL MAIL ORDERS

Qty.	Item	Item Price £	Total £

DON'T FORGET YOU CAN ALWAYS ORDER ON THE TELEPHONE WITH YOUR CREDIT CARD. TRADE ENQUIRIES WELCOME.

*I enclose a cheque/postal order payable to ***ARCADE SOFTWARE LTD,*** for £.....*Please charge to my Access/Barclaycard account no.

*Please delete/complete as applicable.

Signature _____

Name: Mr/Mrs/Miss _____

Address _____

SPL

All you need to crack machine code

For the Spectrum 16k & 48k

Test tools for Spectrum & ZX81/TS1000

The ultimate professional tutor and de-bug program. We wrote this to help us write Machine Code!!

• Test and Display Machine Code instructions as they're written • Ideal for both the beginner and expert • Fully documented with 32 page tutorial • HEX: Decimal converter as standard • PLUS • Character Generator of unbelievable quality!!

Full screen editor/assembler for Spectrum

The latest and most comprehensive Editor/Assembler yet produced.

• Full Screen 42 col. input/text editor • Assemble to screen/printer and or tape • Assemble derivatives DEFM, DEFS, DEFW, DEFB, DEFL, ORG, EQU, END • Comprehensive syntax check • Binary, Octal, HEX & ASCII constants • Will even operate as a simple word processor • Fully documented instruction book • Plus Character Generator . . . plus, many, many more, all you've ever needed

Master tool kit for Spectrum

• Re-number facility • Delete copy and move block function • String search and substitute facility • Variable dump • Cross reference • Trace function • Real time clock and alarm system.

POST TO: OXFORD COMPUTER PUBLISHING LTD., P.O. BOX 99, OXFORD

Please send ☐ **Machine Code Test Tool** ZX81
☐ **Machine Code Test Tool** Spectrum
☐ **Editor Assembler** ☐ **Tool Kit**

£9.95 each, any 2 or more **£9.25** (Postage free UK only). Overseas add £1 per program.

NAME .....

ADDRESS .....

Also available from most branches of W. H. Smith and other retailers. Also from Buffer Micro, Streatham.

ACCESS CARD NO. .....

EXPIRY DATE .....

THE TOMB OF DRACULA!

3D HORROR ADVENTURE GAME!

For ZX81 with 16K RAM £3.95
For 48K SPECTRUM £4.95

For the **16K ZX81** or with colour and sound for the **48K SPECTRUM,** a superb 3D graphics adventure game! **Enter** Dracula's tomb at 30 minutes to sunset . . . **wander** through the tomb's pre-mapped 300 vaults in search of the fabled Vampire's Treasure . . . **pick up** valuable silver stakes and use them to defend yourself against the lurking horrors . . . ghouls, zombies, pits of primaeval slime . . . **See** them all on the computer's plan of the tomb . . . when it will let you! **Take** a chance on a Mystery Vault . . . if you dare! And all the time the minutes are ticking by to sunset . . . when **Dracula** rises from his coffin and comes after **you!**

Castle Colditz

ESCAPE-OR-DIE ADVENTURE.....!

For ZX81 with 16K RAM £4.95
For 48K SPECTRUM £5.95

You are an Allied POW in the infamous **Castle Colditz,** Nazi fortress jail for Allied prisoners-of-war! Can you escape with your life through the vast labyrinth of rooms to the main gate? Tackle brutal **Gestapo** and **SS** guards, savage guard-dogs, traps and pitfalls! Survive if you can the **Corridor of Rats,** the **Tunnel of Poisonous Spiders,** the **Vault of Human Bones** and many more! And on your way, grab all the fabulous **Nazi loot** you can carry!

Price includes ready-to-load cassette with library case and inlay, full instructions, postage and packing. **Order today!** Money refunded if not delighted!

Send cash, P.O. or cheque to:

FELIX SOFTWARE (DEPT. SU10)
19 Leighton Avenue, Pinner, HA5 3BW.

Member of the Computer Trade Association

SPLAT

£5.50

SPLAT AN ORIGINAL 48K ZX SPECTRUM CHALLENGE BY THE AUTHOR OF MINED-OUT. OBJECTIVES: EXPLORATION, SURVIVAL AND EATING GRASS!! Zippy, Plums, Rivers, A massive 21K play area, 7 levels to explore, User defined controls, also Kempston & A.G.F. joystick compatible, £500.00 High Score Competition. SPLAT evolution by Ian Andrew & Ian Morgan. Also available from all good computer shops.

Please send me . . . . copies of SPLAT @ £5.50 inclusive 1st Class Post.
I enclose cheque/P.O. for £ . . . . or please debit my Access Card No.

Name.....

Address .....

.....

ISL INCENTIVE SOFTWARE LTD – 54 LONDON STREET – READING (0734) 591678

INTRODUCING 16/48. THE NEW MONTHLY COMPUTER MAGAZINE WE'VE GOT TAPED.

Forget about listings, copy typing, crashed programs and misprints. Move into a new era with the machine readable monthly.

Every month you get News, Reviews, Games and Educational programs. Month by month you can build a library of useful machine code routines to give your software that professional finish.

There are help features for programmers and for adventurers and every month great prizes to be won in our exciting competition.

WIN A DIGITAL TRACER OR A LIGHT PEN

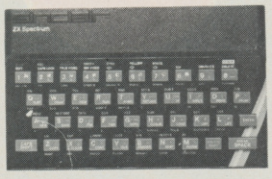
With the help of the machine code in our first competition, you will produce high speed animation you never thought possible. Combine a little skill with with lots of imagination and you could be our first winner.

A FEW OF THIS MONTH'S GREAT FEATURES INCLUDE...

Copter – shoot and then fly!
Stroke 4 – High speed educational animation
Soundfx – a machine code noise library
Dungeons and Green Men – expert help for reluctant prisoners and goblin fodder.

PLUS LOADS MORE TO LOAD

ESPECIALLY COMPILED FOR YOUR SINCLAIR ZX SPECTRUM



16/48 will run on 16K and 48K machines. In fact the magazine knows which machine you are using and automatically uses the appropriate addresses.

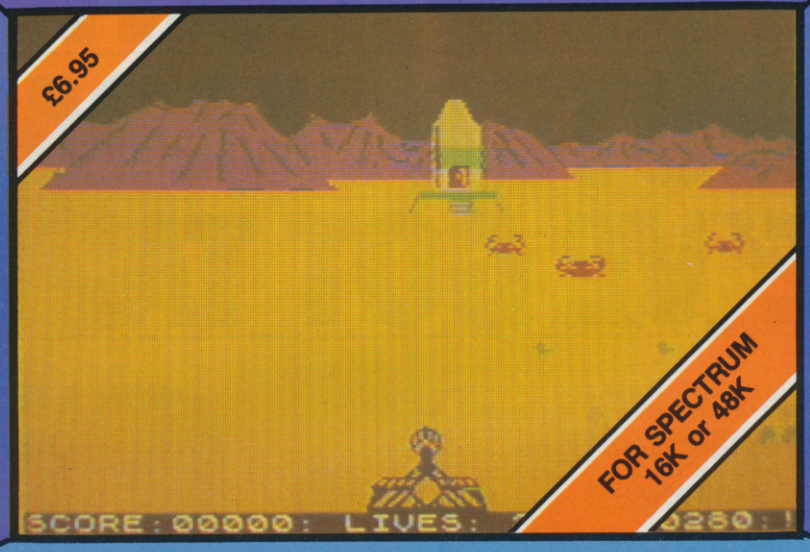
16/48

THE MONTHLY CASSETTE MAGAZINE FOR THE 16K & 48K ZX SPECTRUM

Published by Magnetic Magazines Ltd., PO Box 180, Kingston-upon-Thames, KT2 6AL. Surrey

AVAILABLE IN BRANCHES OF W.H. SMITH, JOHN MENZIES AND OTHER LEADING NEWSAGENTS. LOOK OUT FOR THE LAUNCH ISSUE ON 13th OCTOBER

MICROMEGA



3D 3D

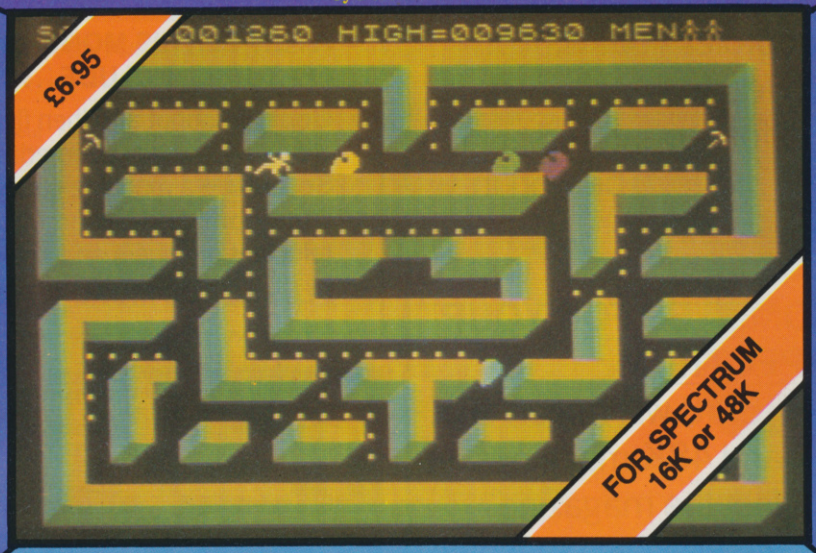
LUNA CRABS

by M J Estcourt

NEW SOFTWARE FOR A NEW DIMENSION
The Graphics Tell The Story.....

HAUNTED HEDGES

by Derek Brewster



3D 3D

AVAILABLE NATIONALLY FROM ALL GOOD RETAILERS

MICROMEGA · PERSONAL COMPUTER DIVISION · QUANTEC SYSTEMS & SOFTWARE LTD · 230 LAVENDER HILL · LONDON SW11 1LE

gemtime

Murder at the Manor

Death comes to a quiet country village when the Lord of the Manor is savagely murdered.

The police are baffled with no obvious clues to help them.

Your skills as an ace investigator are required to identify and apprehend the murderer. This will involve searching for clues (which could be dangerous requiring ingenious deductions), examining the scene of the crime and asking questions of the right people.

What is the mystery of the Gravediggers Hut?
What secret does the safe hold?
What lurks at the bottom of the brook?

These may be some of the questions you will ask yourself during your investigation into the **murder at the manor.**

The game is based on a fixed map, comprising the Manor House, the Garden, the Town, the Graveyard and many other fully described locations, inhabited by a variety of individual characters whom you are likely to meet.

Its up to you to solve the murder, the locals may know the answer — but will they tell YOU!

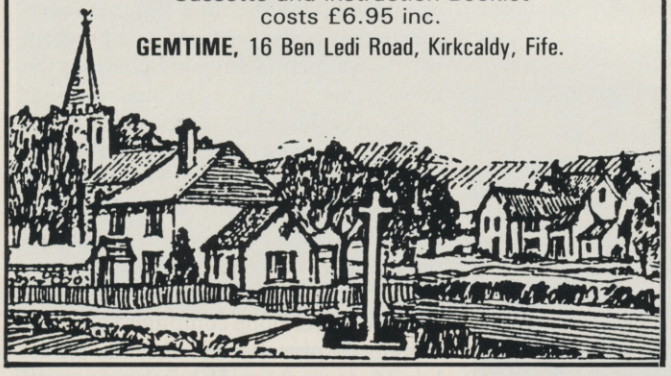
This original adventure fills your 48K Spectrum with over 120 locations, all of which are depicted in full colour machine-coded graphics.

Add sound effects, a full score and save game facility plus a comprehensive and easy to use command analyser (incorporating abreviations and multi-command lines) and you are sure of many exciting and frustrating hours.

WARNING — this is a 4D adventure where night brings added difficulties.

Cassette and instruction Booklet
costs £6.95 inc.

GEMTIME, 16 Ben Ledi Road, Kirkcaldy, Fife.



Are your finances driving you mad?

Do you find that working out your finances makes your head buzz? Do you see red?
Don't worry, now you can have Hilton's **Personal Banking Service** on your side, giving you a clear head start and (hopefully) putting you back into the black!
Maintain permanent records and fully detailed statements of your finances + Search facility.
Bank Reconciliation module is included to automatically match your Bank Statement to your **PBS** account.

* **ZX81 £9.95 (16K)**
* **ZX SPECTRUM £12.00 (48K)**
* **DRAGON £12.00 (32K)**
* **BBC £9.95 (32K) PBS only**

guaranteed after sales maintenance provided.

NEW RELEASES

SPECTRUM (48K)
GARDEN BIRDS **£6.50**
A captivating introduction to Ornithology and entertaining
PLAY TYPE & TRANSPOSE. £9.00
Compose, transpose key, Play it Save it, Print it!
DRAGON (32K)
UTILITIES 1 ..... **£5.00**
Including Compress, Catalogue and Copy
DISASSEMBLER **£5.00**
Prints either to screen or printer in HEX and MNEMONICS
MEMORY MAP **£5.00**
Over 9 A4 pages of Dragon Memory locations. INVALUABLE!

ORDER by POST (specifying machine)
OR at the POST OFFICE using
TRANSCASH ACCOUNT 302 9557

HILTON COMPUTER SERVICES

Hilton Computer Services Ltd
(Dept SU) 14 Avalon Road,
Orpington, Kent BR6 9AX

Ask for the PBS at your local computerstore.

MIKRO-GEN

Mikrogen is one of the longest established and most experienced companies in the home computer market.

We market to such names as W. H. Smiths, Software Masters, Psion/ Sinclair Timex Corp etc. We also have our own rep network covering all retail outlets.

Our reputation has been built on top quality software.

CAN YOU WRITE TOP QUALITY SOFTWARE

To Supplement our already highly successful range we are now looking for programs for all the popular home computers including games, utilities, education + business software.

If you feel that your programs can meet our high standards then contact us at the address below or **Telephone 0344 27317.**

MIKRO-GEN, 1 DEVONSHIRE COTTAGES, LONDON ROAD, BRACKNELL, BERKS.

Getting the ZX-81 to do things others cannot

Robert Entwistle and his family are spreading the word about Sinclair's second machine. Claudia Cooke reports on their success

ROBERT ENTWISTLE and his family have a ZX-81 but you would not think it to hear them talk. They are lying, you would think, because their computer does things a ZX-81 cannot do.

True, but that is because Entwistle has adapted it to suit his family needs. All those games for two players, for instance, the Entwistles did not think much of them because they involve two people hovering irritably over one small keyboard.

Instead, Entwistle bought two second-hand keyboards, one for each player to hold in his hand, and built a circuit connecting them to his ZX-81. He is a value engineer by profession and was helped considerably by his familiarity with digital circuitry; but that is not all he has done.

His computer can play tunes, because of an I/O port connected to a loudspeaker which he has attached to the computer. When he wanted to increase capacity from 1K to 2K, he fitted the new chip. "Easy, and much cheaper than buying the whole thing".

The musical side of the computer is the best part for 42-year-old Entwistle. Never having studied a musical instrument, nor learned to read music, he nevertheless bought a concertina which he has since taught himself to play.

"Because I cannot read music, the musical editor in my computer has helped enormously. I program it to play a certain tune for me and then I can learn it by ear, rather than going slowly through each note from the sheet music. It helps because it tells me at once what the music is trying to do and what it should sound like", he says.

Entwistle bought the concertina because it was an apt instrument for accompanying song. He admits that had he known anything about music, he might have chosen a different, easier instrument.

As it is, he has persevered and now plays regularly with his local Morris band, the Gloucestershire Morris Men. That, in turn, has led to a deeper involvement with the band and he now dances with it, too.

"It's great fun and has turned into a hobby for me. We perform locally most of the time but we go further afield on occasions, too".

Entwistle believes now in the value of music and his three children — James, aged 16, Charlotte, 13, and 11-year-old Alice — have learned to play the violin, piano and recorder. They also play

variously the guitar, mandolin and other instruments.

The computer, too, has added another dimension to his children's lives. Entwistle and his wife Catherine decided to buy one two years ago specifically so that their children could become familiar with its operation and its potential.

"The response has been varied, I must say. Charlotte is not interested; she and my wife will play a game under sufferance but that is about all. Alice is keen and will type-in a program from a magazine and then play it. My son James uses it a great deal. He will read through the programs in a magazine and then write his own, with improvements."

Entwhistle and his son write almost all their own programs and their first attempt with the ZX-81 was with a program they had written.

"By writing your own program you really have to understand what it is doing. Having to solve problems helps you to understand. It certainly was not easy. We wrote a game of Duckshoot and now we have about four versions which work with varying degrees of success".

They also have several other games, a program of electronic organ music and one which plays the tune *Yellow Submarine.* James is also working on a program which is a map of England charting the movements of the various ancient tribes. He hopes to ascertain from it how the climate affected geographical prosperity among the tribes and how that relative prosperity was responsible for the movement of each tribe around the country, or eventual annihilation.

It is an ambitious project for a boy who has never done computer studies at school, despite the fact that his school has 10 computers. His father says: "I am not happy that so many schools are not teaching pupils about computers. You really need one keyboard between two children for it to work properly; it is no use having a handful of computers and several hundred children".

James has become so well-versed in computing since the advent of the ZX-81 in his Cheltenham home that he is now doing a computer project for the Duke of Edinburgh Silver Award scheme.

The Entwistles have progressed to a 16K RAM pack and feel there is no need to buy anything bigger as they are still exploring its full potential. James recently had a German boy staying for a week on an exchange visit and the visitor had to be restrained from buying a ZX-81 on the spot. He had seen one at a friend's house in Germany but had thought it looked uninteresting until he arrived at the Entwistle home.

Alice, too, is doing a good promotion job at her primary school, where she proved invaluable when the teacher decided to give lessons on computers. It seems she did half the teaching.

For Entwistle, the concept of computers is not new. He first had contact with them while he was reading physics at Southampton University. He went on a one-week computer course and remembers learning on a Pegasus.

"No-one will even know about the Pegasus now and things have certainly changed a great deal since then. Even so, the course was helpful in allowing us to understand what a computer can do," he says.

Entwistle's next contact with computers was at work, in his job as value engineer for Smiths Industries, just outside Cheltenham.

"We were having difficulty getting the adjustments correct while making an altimeter. We were not getting the proper number of instruments made and it was costing a packet. We tried a calculator and that was not enough, so we got a Hewlett-Packard 9825. I was given the computer and the manual and told to sort it out.

"I had no one to turn to and I spent about three months working it out and writing the program. We had the computer work out the exact adjustments we needed to make to the instruments, like how many turns for each screw.

"After about the third attempt it solved everything. We had 15 men making that one type of altimeter and the team went down to nine as soon as the computer arrived. Now we have an HP85 for setting-up pilot display units and we use a computer for automatic tests, too. It has made an enormous difference," he says.

Entwistle is critical of a good deal of software on the market because, he says, it caters only for people who already understand what they are doing.

"One of the things I like about the ZX-81 is that it stops you if you program an incorrect line. Some of them let you put in the whole program before you discover it is incorrect. Then you still do not know where you have gone wrong".

At work, Entwistle looks forward to the time when computers, used as a database, can all be linked for more efficient access to information. Already computers have changed the look of things. "You used to see people with soldering irons and breadboards all over their workbenches. Now it is all keyboards".

'One of the things I like about the ZX-81 is that it stops you if you program an incorrect line. Some of them let you put in the whole program before you discover it is incorrect.'

There is also a microcomputer club where Entwistle works and he and his children attend the regular monthly meetings to swap ideas and learn new approaches. The club also has a Dragon and a Vic-20 which members can borrow and take home.

Altogether, it has created a new world for the family, a world which is educating them as they play.

Entwistle has always been mechanically-minded and built a four-valve radio when he was 14, followed by a radio-controlled model car. "It would jam all the CB if I switched it on now", he laughs.

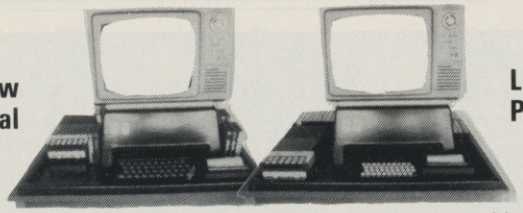
He would not advise his children to make a career in computers, because he believes computers will become part of most careers anyway, whether accounting, medicine or anything else.

"I expect my children to recognise the difference between good and bad software. You hear them at the homes of friends criticising the games and listing all the possible improvements," he says. When his daughter asked for a particular board game for Christmas, he wrote a program of it for the computer instead.

The computer does not rule their lives; they do not use it every day but together Entwistle and his son are learning more and more as they explore the seemingly limitless potential of the ZX-81.

DESKTOP CONSOLE FOR ZX SPECTRUM/ZX81

New Deal **Lower Prices**



TV/Monitor stand removable for access to add-ons, wiring, etc.
Professional desktop console for the ZX Spectrum/ZX81. It raises and tilts the TV/Monitor to minimise eyestrain, holds in place the ZX printer, RAM packs (and other add-ons), power supply, tape recorder, ZX Microdrive and hides most of the wiring.
Provides storage space for cassettes.
Optional: Two built-in illuminated power switches.
Console colour finish: Matt black.
*SEE SPECIAL DEAL BELOW.

.....

Date.....

YOUR NAME AND ADDRESS (In Capital Letters Please) .....

.....

.....

.....

Qty	Description	Item Price	Total
	Console for ZX Spectrum/ZX81	£22.00	
	Power Switch for Tape Recorder	£3.00	
	Power Switch for ZX Spectrum/ZX81	£3.00	
	*1 Console complete with optional switches + 1 ZX Spectrum 48K	£150.00	
		Sub Total	
		Post & Packing	£3.50
		Total Due	

Cheques/P.O. made payable to:
COMPUTERLOCK,
2 WYCHPERRY ROAD,
HAYWARDS HEATH,
WEST SUSSEX RH16 1HJ
Telephone: (0444) 451986.

All Prices inclusive of V.A.T.
Allow 14 days for delivery.

HEART RATE MONITOR
FOR ZX-81 and SPECTRUM

SAFE – RELIABLE – EASY
USE YOUR COMPUTER FOR HEALTH AND FITNESS

Convenient to use. Continuously monitors your pulse and displays digital heart rate on the screen. Plug in heart rate monitor suits Spectrum and ZX-81. Detects your pulse from finger or thumb placed over the sensor unit. The sensor unit is linked to the heart rate interface by 3 metres of cable. Includes an extender card – allowing use of printer, RAM pack etc. Takes power from the computer – avoids the use of batteries.

PRACTICE RELAXATION
Concentrate on reducing the displayed pulse rate. Your progress can be recorded and displayed as a 'rate of fall' which you can use as a personal performance record.

MONITOR FITNESS
Check your heart rate before and after a set exercise. Monitor how quickly it returns to normal. Your fitness level can be assessed by this method and used as a yardstick for future comparisons. Whatever form of exercise you take its effect on the pulse rate can be a significant indicator of fitness.

Simple basic programs can be used to produce graphs of heart rate versus time. Linked to your ZX-81 or Spectrum computer the signal can be used in your own simple basic programs to give continuous heart rate displays, bar charts, graphs etc. Compatible with all levels of program from simple basic routines upwards. Spectrum users can incorporate beep commands to give 'ECG' type sounds.
Does not interfere with the use of a printer – so you can down load your performance curves for comparison.

SUPPLIED READY BUILT – includes plug in Heart Rate Monitor interface with extender card, sensor unit and linking cable, software and instructions, READY TO USE £29.98. ORDER AS: HEART RATE MONITOR (HRM SU). STATE ZX-81 or SPECTRUM. £29.98.

ZX SPECTRUM AMPLIFIER

250mW output. Volume control. Internal speaker. Very simply connected using load/save lead. Puts real power even into the simplest. "Beep" commands. Adds a real "zing" to musical programs and games. Requires PP3 battery – not supplied. Very low current drain. Supplied ready built complete with demo software and instructions.

ORDER AS: ZX SPECTRUM AMPLIFIER (SA SU) £6.98

ZX SPECTRUM SUPER AMPLIFIER

250mW output. Now add synthesizer quality to those "Beep" commands. Super circuit with adjustable ATTACK, SUSTAIN and DECAY envelope controls. Plus variable ECHO. Generates a wide range of special effects. Five graduated controls. Internal speakers. Very smart case. Requires batteries – not supplied. Very low current drain.
Ready built complete with demo software and instructions.

ORDER AS: ZX SPECTRUM SUPER AMPLIFIER (SAA SU) £17.98

MAGENTA ELECTRONICS LTD, Dept SU2, 135 Hunter Street, Burton-on-Trent, Staffs DE14 2ST. (0283) 65435. Prices include VAT, add 50p p&p. Cash with order. Access/Visa by phone or post.

campbell systems ★ ....put your Spectrum to work ★

MASTERFILE

"The most comprehensive of the data-bases...."
Sinclair User June 1983

Design features
- ★ menu driven
- ★ fully machine coded
- ★ dynamic variable length file– NO WASTED SPACE
- ★ update, erase, copy any record
- ★ you have up to 32K per file
- ★ open ended – ready for microdrive

Files
- ★ up to 26 ITEMS per record
- ★ up to 128 characters per ITEM
- ★ save and load FILE independently of the program
- ★ search FILE for numeric or character comparison – on multiple levels

Display
- ★ up to 36 different user-defined ways of viewing selected data
- ★ sequence by ITEM or chronologically
- ★ 1-21 RECORDS displayed at a time
- ★ pageing
- ★ printing
- ★ scrolling
- ★ TOTAL / AVERAGE any ITEM
- ★ optional USER-BASIC for tailored processing

Now accepted as the definitive filing system for the 48K Spectrum £15.00

Masterfile-16 **a subset for the 16K Spectrum** £8.95

DLAN Display Language
FOR ZX SPECTRUM 16K/48K

a simple, powerful machine coded interpreter for generating dynamic textual display for use in advertising & education

THE HIT OF THE LAST MICROFAIR

SEE US AT THE 8th ZX MICROFAIR ALEXANDRA PALACE SATURDAY AUGUST 20th

- ★ DLAN commands are all single letter or symbol
- ★ define any window on the screen and recall as often as you like
- ★ print any text you like in any combination of 11 fonts, specially designed by Image Systems in a range of styles and sizes, some with proportional spaced letters
- ★ scroll your text any which way you choose within the window – or the whole screen if you wish
- ★ largest font size 3x2
- ★ word processing keeps left hand margin clean
- ★ BRIGHT, DULL, FLASH, STEADY
- ★ GOSUB equivalent
- ★ screen timing commands
- ★ 48K DLAN gives you 26K of space in which to place your display commands – 16K DLAN gives you 2K
- ★ 8-page manual

★★★★★ SPECIAL INTRODUCTORY OFFER £7.95

THE FAST ONE 16-64K ZX81
"One of the best data-management systems available for the ZX81."
Sinclair User June 1983 £12.00

GULPMAN Spectrum 16/48K £4.95

GULP 2 ZX81 16K £4.75

All programs mailed 1st class by return. Prices include VAT and postage within Europe. SAE for full list.

Send your order with a cheque or postal order to Campbell Systems (Dept) 15 Rous Road, Buckhurst Hill, Essex IG9 6BL England Telephone 01 504 0589

CS

cp software

Spectrum software

BRIDGE PLAYER

At last you can play Bridge against your Spectrum. Unlike other bridge type programs, Bridge Player does not use pre-dealt hands. Uses the Acol bidding system, scoring and replay facilities included. Forms an ideal combination with our Bridge Tutor.

48K Spectrum £8.95

COLOSSAL CAVES

Enter the Colossal Cave, discover the treasure left by the wizard. On your travels you will meet dragons, snakes, trolls and other denizons of the underworld. Be warned, this adventure can be addictive. Includes a save facility so that the adventure can be continued from the point reached when saved. This is based on the original adventure game by Crowther with 140 locations and a vocabulary of more than 200 words.

48K Spectrum £6.95

GOLFING WORLD

Choose a club and the direction, use your skill to miss the bunkers, trees and water, reduce your handicap and watch your game improve. Get your handicap below 12 and enter the Championship; win this to qualify for the Open.

48K Spectrum £5.95

SUPERCODE

The ultimate Machine Code Took Kit with 90 routines. Dozens of screen routines. Renumber with and without go to's, go subs etc., beeper routines, disable break key, random number generator.

16K and 48K Spectrum £9.95

FLOATING POINT FORTH
WITH EDITOR

Supports Forth 79 structures, trig functions etc., the ZX printer and access to 1/0 ports. Has all the Spectrum hi-res colour graphics, plot and draw and beeper facilities. Allows direct entry of machine code. Comprehensive user guide.

48K Spectrum £13.95

ZX REVERSI

When put to the test against other Spectrum Reversi programs, ZX Reversi was the conclusive winner. 10 levels of play (easy to expert). Self Play, handicap system, set up a position, select the colour of the display plus other features.

48K Spectrum £6.95

SUPERCHESS II

One of the strongest Spectrum chess programs whose features include: · 7 level of play · Plays a variety of openings e.g. French Defense, Sicilian Defense, Ruy Lopez, Queen's Gambit etc. · Self play mode · Analyse mode · Enhanced end-game play · Recommended move option.

SUPERCHESS II

16K Jupiter Ace	£8.95
Lynx	£8.95

48K Spectrum £7.95

SNAIL LOGO

An advanced implementation to the Logo turtle type graphics. Uses the original style Logo instructions to control the movements of a graphical Snail around the screen instead of a mechanical turtle. Includes the following features: · Full operating system and Editor · Comprehensive user guide with sample programs · Multi-level Hierarchic Procedures · Procedures with Parameters · Recursive Procedures · Nestable repeat loops · Variables · Colour and wall bouncing controls · 25 Language Instructions, over 20 warning and error messages · Commands to control the optional ZEAKER turtle.

48K Spectrum £9.95

Plus all our usual programs:

ORIGINAL SUPERCHESS	
16K ZX81	£4.95
48K Spectrum	£4.95
16K SUPERCHESS	
16K and 48K Spectrum	£6.95
ZX DRAUGHTS	
48K Spectrum	£5.95
16K Jupiter Ace	£6.95
Lynx	£6.95
BACK GAMMON	
48K Spectrum	£5.95
SOFTALK I Multiwords	
48K Spectrum	£5.95
SOFTALK II Spacegames	
48K Spectrum	£5.95
BRIDGE TUTOR	
Beginners or Advanced 16K and 48K Spectrum	£5.95
SPECTRUM FORTH Integer	
16K and 48K Spectrum	£9.95

Also available at Boots, WH Smith and all good computer shops.
Send SAE for catalogue.

Access

UK prices include VAT and post & packing
EUROPE add 80p per program. **ALL OTHER PLACES** for air mail add £2 for the first program and 50p for each subsequent program. Surface delivery add 80p per program.

Send cheque, postal order or Access no. to:

CP SOFTWARE, Dept.SU8,17 Orchard Lane, Prestwood, Bucks. HP16 0NN

MZ–8

CMOS STORAGE/MEMORY WITH BATTERY BACK UP FOR ZX-81 1K or 16K

★ Fast Load, Save and Delete ★

★ Stores up to 10 Programs ★
(6K total) for instant recall

★ Software in Onboard Eprom ★

★ Switchable "Write Project" ★

★ Alternative use as extra memory ★

★ Plug-in with connector for Ram Pack ★

Inc. Price £44.90

With full instructions

MICRO-Z LTD
PO Box 83, Exeter
Devon EX4 7AF

S.A.E. for full details

UPGRADE YOUR SPECTRUM to 48k

with an EASY TO FIT DELTA-RAM KIT

SPECTRUM 1 ☐ **£33**

SPECTRUM 2 ☐ **£26**

Each kit contains step by step instructions for easy, trouble-free installation within your Spectrum case. Prices include p. & p. and V.A.T.

FREE with every order the UNIQUE DELTA CHIPCHEK Memory Diagnostic Cassette worth £3.50

All you need to do is cut out this coupon, tick the appropriate box, enclose your cheque or Access/Barclaycard No. and we'll do the rest.

Name .....

Address .....

..... Postcode .....

Access or Barclaycard Number ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Make cheques payable to Servodata Ltd.

DELTA RESEARCH LIMITED
10a The Broadway, Newbury, Berkshire RG13 1BA
Tel:0635 45373

+ + +

OMNICALC (48K Spectrum)
The best Spectrum spreadsheet you can buy. Written in machine code to be faster, to give you more space for data, and to allow more features to be included, it is guaranteed uncrashable.

★ 99 columns or 250 rows.
★ Fully prompted input.
★ Extensive repeat facilities.
★ Supports ALL Spectrum functions.
★ Unique iterative facility.
★ Totals/Sub-totals.
+ many more.

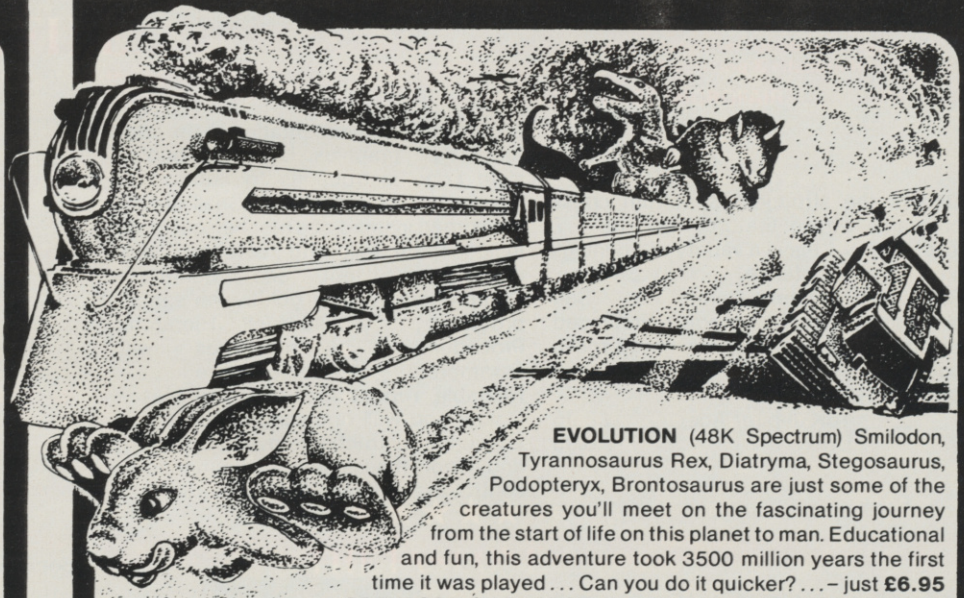
"If more programs shared the quality of OMNICALC then we might see more Spectrums in offices"
Home Computing Weekly 3/6/83

"It is ideal for someone who has just found the spreadsheet concept, but it is also a very powerful tool for anyone who has used one previously"
Sinclair User June 1983

Complete with comprehensive manual. **£9.95.**

MICROSPHERE

72 ROSEBERY ROAD · LONDON N10 2LA
TELEPHONE 01-883 9411



EVOLUTION (48K Spectrum) Smilodon, Tyrannosaurus Rex, Diatryma, Stegosaurus, Podopteryx, Brontosaurus are just some of the creatures you'll meet on the fascinating journey from the start of life on this planet to man. Educational and fun, this adventure took 3500 million years the first time it was played... Can you do it quicker?...– just **£6.95**

CREVASSE / HOTFOOT (Any Spectrum) Can you make it across the ice-cap whilst chasms open and close all around you... or help a hungry rabbit in a hostile world . . . *"Simply Wonderful"* Sinclair User June 1983... 2 original games on one cassette– only **£4.95**

THE TRAIN GAME (Any Spectrum) The game that starts where model railways left off. Full graphics featuring passenger, goods & express trains; tunnels; stations; turntable bonus games; irate passengers; collisions; derailments; and everything else you expect from a major railway! – Superb value **£5.95**

NEW FOR SPECTRUM

NEW ON SPECTRUM 48K. Dramatic all-graphics reconstruction of a famous World War II campaign. Your hand-picked force has dropped behind enemy lines to capture a strategic river crossing, 10 levels of play.

A LOTHLORIEN BEST SELLER

AND
W2 REDWEED Spectrum 48K. All graphics wargame. Prevent the Martians and Redweed reaching London.
W3 JOHNNY REB Spectrum 48K. All graphics Battlegame for 1 or 2 players.
W4 WARLORD Spectrum 48K, ZX81 16K. Adventure game in Medieval Japan. 3 levels of play.
W7 PELOPONNESIAN WAR ZX81 16K. Diplomacy counts high in this strategy wargame.
W8 ROMAN EMPIRE ZX81 16K. Spectrum 16K Strategic wargame with 3 levels of play.
ALSO
L1 PRIVATEER (combined cassette Spectrum 48K, ZX81 16K) Real time graphics game to sink French fleet.
L2 SAMURAI WARRIOR ZX81 16K. Spectrum 16K. Adventure game in Medieval Japan.
L5 TYRANT OF ATHENS ZX81 16K, Spectrum 16K Adventure wargame in the Greece of 470 BC.

All games contain comprehensive playing instructions. Available from better software shops or direct from Lothlorien–simply complete the coupon.
PROGRAMMERS–Contact the Leaders with your wargame software.

Please send me the following adventure wargames.
I enclosed a cheque/P.O. for £_____made payable to M.C. Lothlorien.
Please debit my Access A/c No.__/__/__/__
Signed_____
Address_____

(Tick box)	PARAS £5.95	W2	W3	W4	W7	W8	L1	L2	L5
Spectrum £5.50 ea.									
ZX81 £4.50 ea.									

LOTHLORIEN
the mind stretcher

Send to M.C. Lothlorien, Dept., S1, 56A Park Lane, Poynton, SK12 1AE

HARLEY SYSTEMS LTD

NEW

ANALOGUE INPUT & RELAY SWITCHING INTERFACES FOR ZX81 & SPECTRUM

ADC8 £50 inc VAT
Input sensitivities from 0-10 mV to 0-5V
8 channels. 40,000 readings per second in machine code.
Ideal for data capture & consequensing, control and games.
Monitor most variables without needing an amplifier.

* HIGH SPECIFICATION MODULES *

REL4 £55 inc VAT
HIGH POWER HANDLING.
Max const current 5A. Max voltage 250V. 1KW per channel.
4 channels, each with normally open,norm closed & common.
Use for control of lights, heaters, motors etc.

* DAISYCHAIN UP TO EIGHT MODULES *

HSC1 £15 inc VAT
Connection cable, required for the first interface module in a chain.

Send S.A.E. for free leaflet or complete the form below NOW.

NAME:_____
ADDRESS:_____

Please send me:

QTY.	ITEM.	PRICE.	TOTAL.
___	ADC8	£50	_____
___	REL4	£55	_____
___	HSC1*	£12	_____
	Postage		£1·00

I enclose a cheque for £_____ total

*Please state ZX81 or SPECTRUM
HARLEY SYSTEMS Ltd.,
THE PEPPERBOXES,
GT. MISSENDEN,
BUCKS,
HP16 9PR.

SENSATIONAL **KELWOOD POWER BASE** COMPLETES YOUR COMPUTER

It's so good, Clive should have thought of it!!

● ON/OFF switch for instant screen clearing ● LOAD/SAVE switch ● All wires included ● Angled for easier use ● Saves wear and tear on connections ● Real value for money
Spectrum Ref **PBS1** £13.50 ZX81 Ref **PBZX1** £13.00.

AND ALSO **SOUND POWER BASE** GET REAL SOUND FROM YOUR SPECTRUM

All the features of the Power Base plus built-in variable sound amplifier Ref **SPB1**
Amazing value at ONLY £19.95

The great Spectrum sound improver

SUPER SOUND SPEC-AMP

● Fully adjustable Spectrum Sound Amplifier ● Simply plugs into mic. socket
Ref **SSS** ONLY £7.00 (PP3 Battery included)

ZX81 RAM-PACK WOBBLE?

SOLVE IT WITH A **KELWOOD WOBBLE STOPPER**

● Firmly clamps Ram-Pack to computer ● No glue ● No solder ● Easily removed
Flat: Ref **SW** £5.25. Tilted: Ref **STW** £6.25
Extra long for printer – Flat: Ref **LW** £5.75. Tilted: Ref **LTW** £6.75

COMPUTILT **ANGLED STAND**
'For a better angle'
Fits ZX81 or Spectrum Ref **CS1** Terrific value – ONLY £3.50

KELWOOD almost **WIRELESS WORKSTATION**

● Mains ON/OFF switch ● 4x13 amp sockets inside ● Supreme quality ● All wires stow away ● Carrying handle ● Easily stored ● Sturdily built in stove enamelled steel ● Ideal for schools ● Suitable for most micros including Sinclair and BBC ● Acres of room for all peripherals

Desk top model Ref **CW1** £49.00

Accessories for above
Power Base Ref **PBS2** £11.00
Power Base Ref **PBZX2** £10.50
Legs Ref **LCW** £11.00
Keyboard Dust Cover Ref **KDC** £2.50

All prices include VAT and postage and packing

ORDER FORM

Name.....
Address.....
.....SU

QUANTITY	REF	AMOUNT
	TOTAL ENCLOSED	

Please send me further information with no obligation
☐ *Tick if required*

KELWOOD COMPUTER CASES
Downs Row, Moorgate, Rotherham. **Tel: (0709) 63242**

THE FULLER BOX

The Sound System for the Spectrum

The FULLER BOX added to the ZX Spectrum, improves the sound quality enormously. The built-in audio amplifier working well with all SPECTRUM programs.

The FULLER BOX allows you to program your own music, explosions, zaps, chimes, whistles and an infinite range of other sounds. Based around the popular G1-AY-3-8912 sound chip. It gives you complete control over 3 channels of tone and/or white noise, plus an overall envelope control.

Also provided with a joystick port, the unit gives instant command over all your own games programs. The port is compatible with all the commercially available joysticks eg. Atari/Commodore.

The FULLER BOX is complete with full documentation and a demo tape which includes the type of sounds you can achieve. It also allows you to program your own sounds. Fitting neatly onto the back of the SPECTRUM, the FULLER BOX still allows access for other peripherals, including the new SPECTRUM Micro Drives, via its duplicate user port.

Certain Imagine, Arctic and A&F games now with speech and sound effects.

£29.95
(inc. VAT)+ 80p P&P

The Fuller Experience.

Firmly established in the development of computer hardware, the acknowledged leaders in their field, the vast range of Fuller experience is available to you through their comprehensive selection of accessories. This ever expanding range makes Fuller the natural extension for your Computer.

£39.95
(inc. VAT)
+£2.50 P&P

THE NEW FDS for the SPECTRUM, ZX81, LAZER 200, JUPITER ACE,

This elegant desk top system, designed for the professional user. In its slimline case, the superior keyboard contains all the graphic characters for the above computers. With the additional function keys and SPACE-BAR, speedy and accurate data entry is made simple.

The Fuller FDS is easy to install, based on the very popular FD42 system, it requires no soldering or technical knowledge. For the user who is reluctant to install his computer circuit board inside the FDS a buffer is available (£9.75 + 80p&p) which simply plugs onto the expansion port and connects directly to the keyboard.

The Fuller Orator – Speech for the Spectrum

A smash hit at a number of recent Micro Fairs, the FULLER ORATOR uses an allophone system. Based on the G1-SP0256 AL voice synthesiser chip. Directly accessable in BASIC, it is able to say anything you command using the keyboard or a games program. It comes in the standard case complete with its own audio amplifier, it allows access to the SPECTRUM for other peripherals via its duplicate user port. Full documentation and demo tape included.

PRICE (inc. V.A.T.) **£39.95** plus 80p p&p.

THE MASTER UNIT — The Ultimate Games Unit

The Master Unit provides all the requirements for the serious games enthusiast, containing not only the FULLER BOX, but also the FULLER ORATOR, all contained within the standard case. The Speech Unit and sound synthesiser combines to provide exciting voice and sound for your games. The other features include, Cassette interface, a variable audio output which may be connected directly to a HI-FI system. The MASTER UNIT provides endless scope in applications, and it allows access to the SPECTRUM for other periferal, via its duplicate user port, i.e. printerface. The MASTER UNIT is complete with full documentation and demo tape which includes the type of speech and sound you can achieve.

£54.95
(inc. VAT)
+ 80p P&P

Please supply the following items: (state items and quantity)

please send me ..... @ £.....

please send me ..... @ £.....

please send me ..... @ £.....

please add £.....for p&p

I enclose a cheque/PO payable to FULLER MICRO SYSTEMS Total £ ..... or debit my Access/ Barclaycard – Card No. [| | | | | | | | | | | | | | | |]

Signature .....

Name .....

Address .....

.....

Access BARCLAYCARD VISA

DEALERS REQUIRED FOR UK & ABROAD ENQUIRES WELCOME

051-236 6109

71, DALE STREET, LIVERPOOL 2

Fuller MICRO SYSTEMS

FULLER MICRO STSTEMS
The ZX Centre, Sweeting Street,
Liverpool 2. Telephone: 051-236 6109

Fuller Quality
Fuller Micro Systems reach for the highest quality in Research and Development, to make our products the BEST.

Fuller Service
In an effort to provide the best service we have built a new MAIL ORDER dept. at 71, Dale Street, Liverpool 2. Due to come into service soon.

Fuller Guarantee
All our products carry a worldw...e one year guarantee.

FULLER stock a full range of components and kits for your, computer, send SAE for details.

FOR YOUR NEAREST

Fuller MICRO SYSTEMS

DEALER

SOUTH

RGR Electronics Education Distributors
'Eversley' High Street Bradsted Kent TN16 1JJ
Fox Electronics
141 Abbey Road Basingstoke Tel: 0256 20671
Vision Store Ltd
3 Eden Walk Kingston Upon Thames Surrey KT1 1BP Tel: 01 546 8974Datastore 6 Chatterton Road Bromley Kent Tel: 01 460 8991
Canterbury Software Centre
9 the Friars Canterbury Kent CT1 2AS Tel: 0227 53531
Bury Computer Centre
11 Guildhall Street Bury St Edmonds Suffolk 1P33 1PR Tel: 0284 705772
Lion Micro Computers
Lion House 227 Tottenham Court Road London W1P 0HX Tel: 01 580 7383
SPI Soundvision
359 Greenlanes Palmers Green London N13 Tel: 01 882 5888
Quids In
38 North Street Romford Essex Tel: 0708 26840
Rush Hi-Fi Centre
5/6 Cornhill Chelmsford Essex Tel: 0245 57593
Swansey Electronics
32 Goldsel Road Swanley
The Data Store Microcomputers
6 Chatterton Road Bromley Kent BR2 9QN Tel: 01 460 8991
The Micro Workshop
12 Station Approach Epsom Surrey KT19 8ES Tel: 03727 21533
Enfield Communications Ltd.
135 High Street Ponders End Enfield Middlesex EN3 4EB Tel: 01 805 7434
JCV Hi-Fi & Video Ltd
Wharf Street Warrick Warrickshire Tel: 0926 493796
Metyclean Ltd. 92 Victoria Street London SW1E 5JP Tel: 01 828 2511
Breaks One Four
130 High Street Edgware Middlesex Tel: 01 952 7488
Square Deal
375 Footscray Road New Eltham London SE9 2DR Tel: 01 859 1516
Buffer Micro
310 Streatham High Road London SW16 Tel: 01 769 2887
Channel One Computer Services
174 High Street Hornchurch Essex
Computersolve Ltd.
8 Central Parade St. Marks Hill Surbiton, Surrey KT6 4PJ Tel: 01 390 5135
Alphascan Ltd.
Little Bourton House Southam Road Banbury, Oxon OX16 7SR Tel: 0295 75606
Computer Corner
261 Commercial Road Portsmouth Tel: 0705 833938
Videola
535 Green Lanes Harringay London N.8 Tel: 01 340 3432
Chelsea Micros Ltd.
14 Jerdan Place Fulham London SW Tel: 01 385 8494
Radford Hi-Fi
43 King Edward Court Windsor Berks
Bartletts Hi-Fi & Video
175/177 Holloway Road London N7 Tel: 01 607 2296
Worthing Computer Centre
32 Liverpool Road Worthing West Sussex BN11 1SZ Tel: 0903 210861
Sutton Home Computer Centre
39 Benhill Road Sutton Surrey Tel:01 642 2869
Spectrum U.K. Ltd.
Burrowfield Welwyn Garden City Herts AL7 4SS For nearest dealer Tel: 07073 34761

SOUTH WEST

Brensal Computers Ltd.
24 Park Row Bristol Tel: 0272 294188
Screen Scene
144 St Georges Road Cheltham Gloucestershire Tel: 0242 28979
Westfarthing Computer Systems
21 Wendron Street Helston Cornwall Tel: 03265 4098
Radford Hi-Fi
52-54 Gloucester Road Bristol Tel:0272 40878
Computervision
4 Market Street St. Austell PL25 4BB Tel: 0726 5297

SCOTLAND

ITEC
Unit 6 13A Harbour Road Inverness IVI 1SY Tel: 0463 226505
Micro Shack
18 Chapel Street Aberdeen Scotland Tel: 0224 636081
Alan R Foulis
12 Richmond Gardens Chryston Glasgow G69 9PA Tel: 041 779 1444
Tomorrow's World
Esplanade Lerwick Shetland ZE1 0LL Tel: 0595 2145
John Menzies Ltd
107 Princes Street Edinburgh Scotland EH2 2YQ
Certain stores only

EUROPEAN DEALERS

CT Data & Elektronik
Alrovej 168 8300 Odder Denmark Tel: 010456551655
Westmoen Data-Elektronik
P.O. Box 359 4581 Lyngdal Norway Tel: 043 43165
Arild Westmoen
Rush Records Duesseldorf West Germany Tel: 8586288 Rush D
Aashima Trading Groenendaal 53 3oll SH Rotterdam Netherlands Tel: 010 141110

NORTH WEST

Diskwise Computer Centres Ltd
68/70 Lower Hillgate Stockport Cheshire SK1 3AL Tel: 061 480 4422
Micro-Tronics
27a Market Street Tamworth Staffs Tel: 0827 51480
Bill Ginty's
9 Bekmont Road Bolton Lancs Tel: 0204 56331
Home Computer Centre
Acme Hire Ltd. 40 King Street Blackburn Lancs Tel: 0254 671316
4-Mat Computing
67 Friargate Preston Lancs PR1 2AT Tel: 0772 561952
Leigh Colour Laboratory Ltd.
87 Chapel Street Leigh Lancs Tel: 0942 607661
Beaver Radio Ltd
20-24 Whitechapel Liverpool L1 6EH Tel: 051 709 9898
Deltar Micros Ltd
The Computer Centre 68 Chestergate Macclesfield Tel: 0625 618827
Pase
213-215 Market Street Hyde Cheshire SK14 1HF Tel: 061 366 5935
Goodrights Ltd
1 Friargate Preston Lancs PR1 2AU Tel: 0772 57528
Dever Microcomputers
21 St Werburgh Street Chester Tel: 0244 316 516
Midshire Computer Services
78 Nantwich Road Crewe Cheshire Tel: 0270 211086
Home Business Computers
54 Yorkshire Street Oldham Greater Manchester
Home Computers Ltd
234 Church Street Blackpool FY1 3PX Tel: 0253 22340
Cleartone Hi-Fi
156-158 Blackburn Road Bolton Lancs
Darlington Computer Shop
75 Bondgate Darlington
D.Tec
165 Old Chester Road Bebington Merseyside Tel: 051 645 8382

NORTH EAST

AFDEC Electronics Ltd
318 Kempshott Lane Basingstoke Hants RG22 5LT Tel: 0256 51841
H A S E
54a Town Street Horsforth Leeds LS1 84AP Tel: 0532 585357
Computer Shop
Unit 25 Handyside Arcade Newcastle Upon Tyne NE1 4PZ Tel: 0632 616260
Barrow Computer Centre
96 Church Street Barrow in Furness Cumbria Tel: 0229 38353
Northern Computing
31 Redrock Road Rotherham South Yorkshire S60 3JN Tel: 0709 60000
Just Micro
22 Carver Street Sheffield S1 4FS Tel: 0742 752732
Erricks of Bradford
Fotosonic House Rawson Square Bradford Yorks BD1 SJR Tel: 0274 309 266

MIDLANDS

Microwave
St Peters Lane Leicester Tel: 0533 29023
ENL Audio Visual Ltd
116-118 Alfreton Road Nottingham Tel: 0602 784015
Datel Electronics
27 Hope Street Hanley Stoke on Trent Tel: 0782 273815
Computer Cabin
24 The Parade Silverdale Newcastle Under Lyme Staffs Tel: 0782 636911
Harborough Home Computers
7 Church St Market Harborough Leicester Tel: 0858 63056
Richard Reeves Ltd
174 Kettering Road Northampton Tel: 0604 33578
Vision on Video
255a High Street Erdington Birmingham B23 Tel: 021 373 9383
Software City
31 Castlecroft Road Finchfield Wolverhampton West Midlands Tel: 0902 25304
RK Computers
37-38 Second Floor The Siver Arcade Leicester Tel: 0533 532911

EUROPEAN DISTRIBUTORS

Computronic Dizengoff Cntr.
Office 426 PO Box 22680 Tel: AVIV 61226 Israel
Rentina 341730 SPEED il
Arnsvik Data Box 19017 S-250 19 Helsingborg Sweden Tel: 046 42 92229
Ramex International 48945 Vandyke PO Box 50 Utica Mitchegan 48087 USA
Melewar Trading Company Ltd
9th Floor Wisma Central Jalan Apang kuala Lumpar Malaysia
Computer Accessories
78 Hout Street Capetown 8001 South Africa
Mega Ltd
7 Anley Street St Helia Jersey C1 Tel: 0534 72263
Sumus Srl/General Processor
via S Gallo 16/R 50129 Florence Italy Tel: 571034 GEN PR 01
Inelec
110 Bis Avenue Du General Leclerc 93500 Pantin nr. Paris France Tel: 213187

IOM

Aldridge Audio
54 Bucks Road Douglas Isle of Man Tel: 0624 23090

We still have vacancies for Dealers in certain areas, for further information contact us now on 051-236 1899 and ask for our dealer manager Mr. B. Parry

HORNBY SOFTWARE

SPECTRUM PRO GOLF SERIES

The nearest to the real thing

* Recommended by "Sinclair User", August

EXACT SIMULATION OF BRITAIN'S TOP GOLF COURSES

(1) ALL GOLF RULES APPLY
(2) DESIGNED FOR ONE OR TWO PLAYERS
(3) PLAYED OFF ANY HANDICAP
(4) ON EACH HOLE DIST, PAR, GREEN ENLARGEMENT
(5) CONTROL SHOT — CLUB, STRENGTH, DIRECTION, SHAPE OF SHOT
(6) GRAPHICS EXCELLENT
(7) EXTREMELY REALISTIC

* TROON £6.95 48K
ROYAL BIRKDALE £6.95 48K
LINDRICK £6.95 48K
(NEW) WENTWORTH — BOTH COURSES £10.00 48K
PRO GOLF £4.95 16/48K
9 HOLE SIMULATED COURSE
ALL PRICES INCLUSIVE OF VAT, P+P, AVAILABLE FROM:

HORNBY SOFTWARE
21 PINFOLD HILL, LEEDS LS15 0PW

odyssey COMPUTING

HIGH RESOLUTION ZX81 PROGRAMS

We utilise a SOFTWARE ONLY technique developed by Steve Briers BSc to produce a stable 248 by 224 pixel display. ABSOLUTELY NO HARDWARE MODIFICATIONS ARE REQUIRED for the following programs:

INVADERS — reviewed ecstatically in 'ZX Computing' — "the Hi-res display really does break new ground . . . an excellent game . . . an outstanding achievement . . . As well as the Hi-res display the facilities offered are impressive" — Need we say more!?

SWARM — a fast moving arcade-type game. Shoot down saucers as they dart across the screen firing their missiles. Progressive difficulty.

ZORF — an advanced arcade game incorporating five different sheets: — INVADERS, GALAXIANS, ZORFIANS, METEOR STORM, & MOTHERSHIP; progressive difficulty.

GRAPHICS — enables you to use high resolution graphics in your own programs. The commands are: CLS, PRINT, PLOT, POKE, DRAW, SPRITE & SCREENOFF. Comprehensive editing facilities are provided and the graphics commands are easily incorporated into BASIC programs.

CAVE CRUSADE — please note that this does not use high resolution graphics, however, the normal graphics are used to good effect. This is a fast moving game in which the player must escape from a cave whilst being persued by its ferocious inhabitants.

NEW! — FOR THE 48K SPECTRUM

SPECTRUM ZORF — similar to our ZX81 program but using colour and sound. This is in fact five games in one, as the player can choose to play one sheet continuously if so desired.

CHILD'S PLAY — designed as a teaching aid for pre-school children with the participation of a parent or teacher. Excellent use made of the Spectrum's colour graphics makes this an enjoyable program to use.

(We are constantly looking for quality Spectrum software for which we pay up to 33% royalties. If you've written such a program then send a sample to us for evaluation. Trade enquiries are welcome).

Send this coupon to ODYSSEY COMPUTING, 28 BINGHAM ROAD, SHERWOOD, NOTTINGHAM NG5 2EP. Tick the programs you require.

__ Invaders	£4.95
__ Swarm	£3.95
__ Zorf	£5.95
__ Graphics	£5.95
__ Cave Crusade	£3.95
__ Spectrum Zorf	£5.95
__ Child' Play	£5.95

I enclose a cheque/postal order for £ ..... made payable to ODYSSEY COMPUTING.

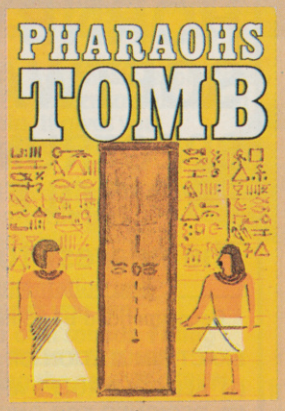
NAME .....

ADDRESS .....

.....

48K ZX SPECTRUM ADVENTURES – PICTURE GRAPHICS AND COLOUR

You are a Knight of Camelot, searching for Merlin's lost treasure. On your way you will discover the Witches' Tower, rescue a Princess held by the wicked Wizard of Trill. **£5.95**

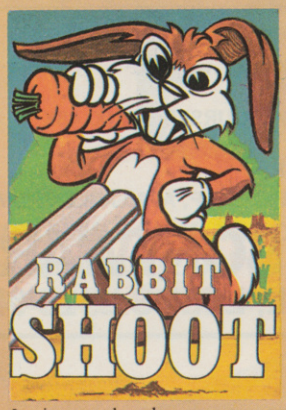


You discover the entrance to an ancient pyramid blocked by a rock. Once inside, you discover fire rooms, ice rooms and other traps set by the builders to protect the Pharaoh. **£4.95**

A rope above a rock fissure is the only way into this Magic Mountain, or is it? Legends tell of vast stores of treasure but also of poisonous spiders, lizards and magic at work. **£4.95**

An old deserted mining town holds the clues to the location of a lost gold mine. Once in the mine, your problems are not over – the roof creaks alarmingly and might cave in. **£4.95**

16K ZX SPECTRUM GAMES AND PUZZLES



It is nearly dawn, you are poaching rabbits in a field of carrots. See how many you can bag undetected by the game keeper. Highly original arcade style game. **£4.95**

The cassette of the book. Contains six games (including Castle Walls, Great Fire of London, Reversi) machine code assembler, disassembler. **£5.95**
Book available separately **£6.50**

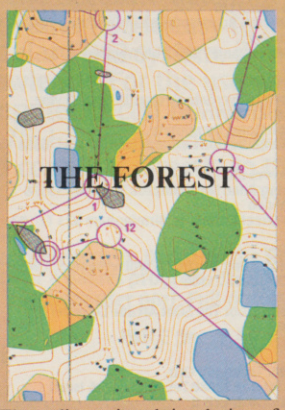
The traditional game with superb screen presentation. Score points by making the two ends add to a multiple of five or three. The first one to reach 72 points wins. **£4.95**

The computer breaks and shuffles a two by two coloured square, whilst you watch the moves it makes. You must then unscramble it to reassemble the original squares. Machine coded. **£4.95**

48K ZX SPECTRUM GAMES

To find the Black Planet you need 7 pieces of the key each hidden on different planets, and needing different puzzles to be solved. On the way, you fight off the pirates who get steadily more desperate. **£5.95**

You are Spectrasses, battling in the arena with Gorgon, whose stare can turn you to stone. To recover the lost chalice, you must also win a swordfight with Grang, inside his cave. **£4.95**



Three dimensional simulation of the sport of orienteering. Display is continuously updated as you run. Ideal for map reading practice. Instructions, colour map and cassette. **£9.95**

16K ZX81

For the ZX81, three adventures – black and white text. Magic Mountain, Pharaoh's Tomb, Greedy Gulch, as described above. Superb value for money. **£5.00**

PHIPPS ASSOCIATES

Dept G FREEPOST EM463 (No stamp)
172 Kingston Road, Ewell, Surrey KT19 0BR
Telephone 01-393 0283. 24 Hour answering.

Prices include postage (outside Europe add £1.00 per item). *Access and Visa cards welcome*

ACCESS VISA

Controlling the Stack is vital in new language

LAST MONTH I introduced Forth and described the various Forth packages which can be obtained for use on the ZX-81 and Spectrum. The Abersoft Forth package is the one I shall be using but the other packages, such as that from Artic, can be used to follow this series.

Abersoft Forth is capable of holding more than one screenful of program in memory at the same time and it is the one which has been recommended by the Forth Interest Group.

This month I explain the main structures which are used to write Forth programs and show why the language is so popular with the microcomputer industry.

Forth operates using an area of memory called the Stack. It can be represented as in figure one onwards. You can see that the Stack grows from one storage unit when something is put on to it to as many as the computer can handle in its memory space. When the computer takes information off the Stack it will shrink until, at the end of the program, it will probably contain nothing.

The computer puts information, usually numbers, on to the Stack in a certain way and it is that which often causes problems for the first-time user. In figure one the computer has put the number 2 on to the Stack. In figure two another number, 3, has been added and

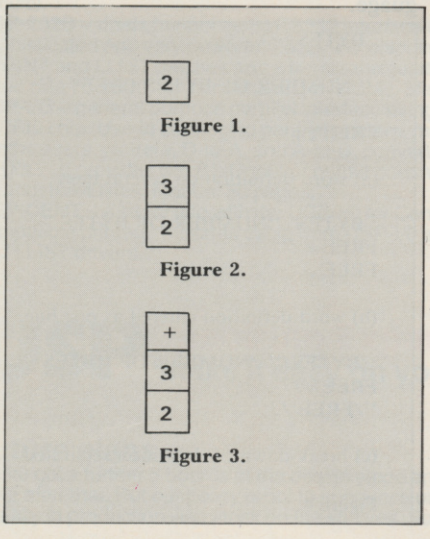


Figure 1.

Figure 2.

Figure 3.

the number 2 has been moved down to make room for the newest bit of information on the Stack.

When information is taken off the Stack, the last bit to go on will come off first. For that reason the Stack is said to be a FILO — First In Last Out — structure. Machine code programmers may find the concept familiar, as the computer also has its own internal Stack on which it stores information about the system. That can be manipulated by machine code programs but is a very risky procedure.

In some cases if you do not take everything off the machine Stack before the end of a machine code program the machine will crash. In the same way you may get strange results if you do not control the Forth Stack properly.

As the Stack is a fundamental part of Forth and handles all the information which goes into the system it is necessary to change the way in which information is dealt with by the computer. That is especially true of the way in which Forth handles arithmetic operations. The machine needs to know which arithmetic operation it is to perform before it gets the data on which it is to work. In the last example the data was 2 and 3 and those numbers were put on to the Stack in figures one and two. The arithmetic operator is the symbol which tells the computer what to do with the two numbers. Valid operators include *, —, ↑ but the one used in this example is the + sign. That is put on to the Stack after 2 and 3 — figure three.

When the computer takes an item off the Stack it will find the + sign and know that the next items on the Stack are to be added together. The sum would normally be written as

2 + 3

but in Forth it is written as

2 3 +

The numbers are first, followed by the operator.

You can enter that sum into the computer in two ways. You could type-in the following instructions.

2 (ENTER)

3 (ENTER)
+ (ENTER)

The other way is to type

2 3 +

putting spaces between the 2, 3, and the + sign. Every piece of information should have a space before or after it, so that the computer can distinguish between one bit and another.

The information is then on the Stack but nothing has been done with it. It will remain there until something else is put on to the Stack or until something is taken off.

To calculate the sum of the two values put on to the Stack in figure three, the Forth print instruction can be used. That is a dot, (.). If you have set up the sum on the Stack all you have to do is to type

(ENTER)

and the answer will appear on the screen, followed by the message 'ok'.

The computer will not display the results of the calculation until you use the print symbol. You can also put the ' ' on the same line as the calculation instruction instead of typing it in separately. That would make the full calculation instruction

3 2 +

and would give the answer

5 ok

That type of instruction is satisfactory if you want to perform one calculation and know the answer immediately, but by using it you can do nothing further.

The instructions used so far have had immediate results and therefore they are operating in what is termed the immediate mode.

An extension of that is the compile mode and it is in that where the full power of the Forth language can be realised.

If you type VLIST into the computer a block of words will scroll up the screen. The command VLIST means vocabulary list and the words displayed are those which are already known by the computer. Words such as UDG and FREE describe functions which can be performed by the computer. Those words operate in a similar way to Basic keywords but they are much more flexible and need no line number to reference them.

The word is the Basic unit of Forth programs. When a word is used the computer will perform a series of actions which are associated with it. For instance, if you type-in

FREE .

the number of RAM bytes which are left free for your programs will be displayed. A beginner may find it difficult to understand the potential of Forth word structures, as they can be used as programs.

That is not possible using the Basic language although it could be likened to calling one subroutine of Basic lines from within another. Forth word structures can also call themselves but that is something which will be explained in another article.

The words which are in the dictionary, or vocabulary, when the language is initialised are small routines which have been built into the language by the original author. Usually they cannot be changed. It is possible, however, to set up your own routines and add them as words to the dictionary. That is done in the compile mode.

In the previous example the number of bytes left for programming in the basic system was determined by typing

FREE .

That produces a number with no reference to bytes. You may want to put in a printed message before or after the number, such as

NUMBER OF BYTES FREE =

That is a very simple process and you can define a word which will do it.

First the computer needs to be told that a new word is about to be defined for the dictionary. That is done by typing a ':' — colon — at the beginning of the first line of the word. That will put the computer automatically into the compile mode and it will wait until you have typed-in your word definition.

'Computer must be told the definition has been completed'

Next, and on the same line of program, you must define the name of the word. The word in this example will be called BYTES as it is best to use one which describes the operation which will be performed with its use.

The message to be displayed can be programmed by telling the computer that it has to print what follows. That is done by putting a print dot after the name of the word and then enclosing the message in quotation marks.

That instruction is slightly unorthodox, as no space is put between the print dot and the quotation mark. Spaces, however, are put between the quotation marks and the message.

After you have typed-in the message, closed-off with a space and quotation mark, you must use the word FREE to calculate the space which is free in the system. Another print dot, after that word, must be used to display the result.

The computer must be told that the definition has been completed and that is done by typing a semi-colon, ';', after the definition.

As you can see from figure four, the complete program can be entered in two ways. You can either type-in the word definition as one long line or you can type it in as a series of lines separated by (ENTER). The constituent parts of the definition have also been included in figure four to make it easier to understand.

There are two ways in which you can see if your new word has been defined by the computer. You could type-in the word BYTES followed by the (ENTER) key and the display should then read

NUMBER OF BYTES FREE =
16512

or the number of bytes which are available to your machine.

Alternatively, you could type VLIST to look at the vocabulary. If your word has been defined correctly you should see it as the first term in the dictionary. As you can see, each new word is entered at the top of that dictionary.

You can use BYTES as a program on its own or you could use it within another word definition, as FREE was used in BYTES to calculate the number of bytes. That is one of the reasons why Forth is regarded as so flexible and why interest in it is growing.

Next month I will examine the ways in which words can be stored in the computer memory using pages of RAM which are called screens. Other Forth words, defined by the computer, will be discussed and some similar applications will be suggested for this versatile language.

```
: BYTES

." NUMBER OF BYTES FREE = "

FREE , ;
```

(a) word definition on several lines

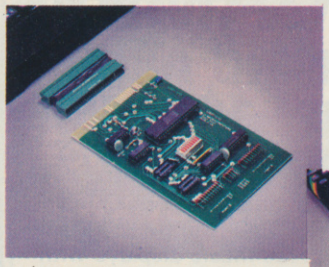
```
: BYTES ."NUMBER OF BYTES
FREE = "
FREE .
```

(b) word definition entered as one line

```
:/BYTES/" /NUMBER OF BYTES
FREE =/
"/FREE /.
```

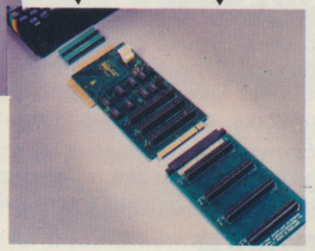
(c) break-down of definition separated by '/'.

Figure 4.



▲ Any single extension card

Backplane up to 3 cards + Backplane up to 4 cards



= 7 cards ▶

ZX Spectrum expansion... ...start with one card... extend up to seven cards!

The price/computer power ratio of the Spectrum is tremendous but up to now its lacked one major thing compared with other Z80, 48K computers costing many times more – expandability.

U-Microcomputers have been the UK leaders in Apple Expansion cards but with the Spectrum we've had to provide the means to expansion (3 and 4 slot backplanes) as well as the initial range:

USP-ADAP – a back to back adaptor needed when you buy your first card and later for the backplane.

USP-BBP3 – a buffered 3 slot back plane, meaning it won't interfere with the Spectrums operation. It will generally require an auxiliary power supply either home built or the USP-Power supply unit (available later). A side connector allows use of the ZX printer and microdrives.

USP-BPE4 – provides a further four slots after you have the USP-BBP3.

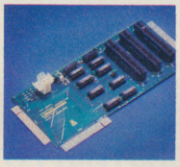
USP-PROT – Prototyping card – use to design and test your own circuits.

USP-232D – dual channel serial RS232 interface using the sophisticated and very powerful Z80DART chip. Includes LPRINT and LLIST patches and a terminal emulator program. Baud rate 75-9600, full handshaking available. Manual 50 pages.

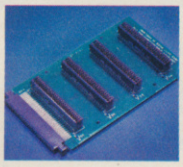
USP-I/O – general purpose parallel interface using the versatile Z80PI0 chip. Use to connect to parallel printers, music synthesisers, plotters, D-to-A, and A-to-D, converters, relays, LED's.... It provides two 8 bit input or output ports with 4 handshake lines. Manual 30 pages.

USP-CENT – a kit for use with the USP-I/0 for Centronics compatible printers. Includes cable from USP-I/0 and LPRINT and LLIST drivers.

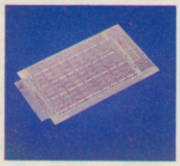
USP-ADAP



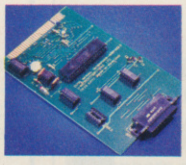
USP-BBP3



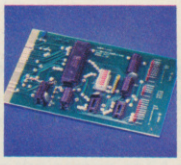
USP-BB4



USP-PROT



USP-232D



USP-I/O

Quality features –
all the boards (except the USP-PROT) have gold plated edge connectors, and solder resist both sides for long term reliability. Comprehensive documentation for beginner or expert included with each board.

USP ZX Spectrum Expansion
'make it easy on yourself'

Future plans

We've got a further 5 boards at the design stage and plans for more after that. But our policy is not to announce until they are actually in production with stock on the shelves. Sorry!

U-Microcomputers Ltd., Winstanley Industrial Estate, Long Lane, Warrington, Cheshire, WA2 8PR.

START NOW
ORDER HERE!

Qty	Item code	Price each £	Total £
	USP-ADAP Adaptor	6.90	
	USP-BBP3 3 slot buffered backplane	35.65	
	USP-BPE4 4 slot backplane extension	25.30	
	USP-PROT Prototyping board	13.80	
	USP-232D Dual serial interface	34.50	
	USP-I/O General purpose parallel interface	29.90	
	USP-CENT Centronics Kit for USP-I/O	3.45	
		plus p.& p.	£1.50
		TOTAL	

Please tick if VAT invoice required ☐

Please send leaflet ☐

To: U-Microcomputers Ltd., Winstanley Industrial Estate, Long lane, Warrington, Cheshire, WA2 8PR

I enclose cheque/Postal Order made payable to U-Microcomputers Ltd., for

£.....

Name

Address

Post Code

12 months warranty. Mail Order only. Western Europe add £2.00

SU.10

RWP/Graphic Design

TRANSFORM LTD.

Business Software

FOR SMALL BUSINESSES AND THE SELFEMPLOYED

Business Bank Accounts
This program enables you to make debits under 11-15 sub-headings. Statements includes totals of all subheadings.
ZX 81 £8.75 ZX SPECTRUM 48K £10.75

Sales Day Book.
For all your invoices, this program will enable you to prepare statements of oustanding invoices. Program will also calculate VAT.
ZX 81 £8.75 ZX SPECTRUM 48K £10.75

Purchase Day Book.
Keeps a complete record of all your purchases under 11-15 subheadings. This program will also calculate and deduct VAT.
ZX 81 £8.75 ZX SPECTRUM 48K £10.75

Business Packs.
Incl. Bank Account, Sales, Purchase & Quarterly Analysis program.
ZX 81 £25.00 ZX SPECTRUM 48K £30.00

Stock Control.
Handles 900 lines, includes details of supplier. Program has full search facilities enabling you to search & update all lines from one supplier. It is also possible to deduct items from stock.
ZX SPECTRUM 48K £10.75

Invoicing.
This Program will print out invoices, calculate discounts and VAT. The program will calculate totals from unit prices, giving the discription of each unit price.
ZX 81 £15.00 ZX SPECTRUM 48K £15.00

Word Processing by Tasman.
Tasword Two is a powerful word processing program that will perform all the functions available on large word processors. The program will give you on screen 64 characters per line.
ZX SPECTRUM 48K £13.90

Masterfile by Cambell Systems.
This is one of the best data systems available for the ZX Spectrum. This program has many uses in a small business.
ZX SPECTRUM 48K £15.00

Dlan by Cambell Systems.
Use your Spectrum to sell your products. Dlan will display your message in up to 11 different typefaces. Will scroll in any direction.
ZX SPECTRUM 48K £7.95

64 Column Generator by Tasman.
You can use this program within your programs to display 64 columns of screen.
ZX SPECTRUM 16-48K £5.50

Payroll by Byte One.
This payroll program will handle upto 40 employees and can calculate N.I.C., PAYE, superannuation and many other deductions. This is a very user friendly program and extremely good value.
ZX SPECTRUM £19.95

Superplan by Video Software Ltd.
This is one of the best speadsheet programs, up to 52 columns full colour display capacity exceeds 40,000 digits.
ZX SPECTRUM £12.00

All the above programs include VAT, post and packing. A VAT invoice will be sent with all purchases.

PRINTERS.

All the above programs will now run on a full size printer, we can now offer you a complete package including interface and printer.

Centronics interface for ZX Spectrum	£39.14
Seikosha GP100A printer	£178.25
Star DP510 printer	£252.00
Epson FX80 printer	£381.60

Many other printers available send SAE for details on software and printers.

Please add VAT to the prices of printers and interfaces and £5.00 for postage of printers.

TRANSFORM LTD.
41 Keats Ho Porchester Mead Beckenham Kent
Tel: 01-658 6350

MUSIC GAMES
AND LEARNING AIDS for Spectrum 16K/48K

FIREWORK MUSIC £5*

This is an action-packed educational game which helps beginners to learn note games in the treble and bass clefs. Its features include high-res music displays with fireworks, explosions and thunderstorms, just for fun!

"Firework Music is an ideal teaching aid for young children learning the rudiments of musical theory." . . . Sinclair User, July 1983.

TUNER £5*

How well can you tune a note? Players have to match musical notes sounded by the computer. Playing is like tuning a guitar and is super practice for all musicians—but this is an absorbing and challenging game whether you play an instrument or not. The 4 levels of difficulty range from novice to expert. Sharpen your skill with the 1-player version then flatten your opponent in the 2-player game!

A range of music software for the 16K ZX81 is also available.
Please send s.a.e. for full Spectrum, ZX81 catalogue.

SOFTWARE COTTAGE

19 Westfield Drive, Loughborough, Leics. LE11 3QJ

*Cheques, P/Os with orders please—payable to SOFTWARE COTTAGE.
Overseas customers, please add £1 for each item ordered.
Price includes cassette, instruction booklet and P&P.

New action sports games feature a 3D view of the game. In football and tennis you play one side, the computer plays the other. The computer is fast and hard to beat. Different skill levels.

FOOTBALL
Each player can move, shoot etc. independently. Includes fouls if players collide, corners, throw-ins etc. Scale 90 minutes play. Any team of names can be used. Game can be suspended and player numbers shown at the press of a key. **Price £5.50.**

BIG MATCH SOCCER
Just like football game but for 2 players. Each player uses keys at his side of the keyboard to control his men. All men can be moved, shoot etc. independently. Practice with football then play your friends in the big match. **Price £5.50.**

SUPER SOCCER
A deluxe version of the football. Even faster action, harder to beat. Choose team colours etc. **Price £7.00.**

TENNIS
Each key plays a different stroke. Move your players anywhere on court. Computer plays a hard game. All tennis rules used, just like the real thing. Proper serving and scoring. Plays 3 sets. Animated figures. **PRICE £5.50.**

TANK BATTLE
3D view from the tanks' turret of woods, villages, attacking tanks etc. Shots can destroy buildings, trees and enemy tanks. 360 degree turret movement. **Price £4.50.**

CAR RACE
You drive one car, the computer the other. Control your car with steering and brakes. Choice of 2 circuits. Lap counters and time recorded. **Price £3.95.**

Buy any 3 games, get any game free
Please add 35p post and packing per order

Winters Ltd, Dept SU, 24 Swannington Close, Cantley, Doncaster, S Yorkshire, DN4 6UA

TRACE

For any ZX Spectrum, and now for the 16K ZX81!!!

A superb aid to programming the ZX81/SPECTRUM, allowing you to watch what your BASIC programs are doing every step of the way. Bugs in your programs will be easier to find. Example programs will almost explain themselves.

Before the ZX81/SPECTRUM executes each BASIC statement in your program it will display the line number, statement number (SPECTRUM), and the statement itself in the input area (it will not overwrite the main display area). The speed is controllable from single step upwards. You can produce a TRACE listing on the ZX printer, stop your program at any point to print variables or correct errors, and start/stop tracing from anywhere in your program.

"an effective TRACE . . . a useful debugging tool . . .easy to use". S.U. 9/83 reviewing SPECTRUM version.

It might even help you find the errors in the magazine listings!

ZX81 (16K) Version £5.95
Spectrum Version £6.95

Including P & P from:

TEXGATE COMPUTERS LTD.
Dept.S., 14 Brook Lane, Corfe Mullen, Dorset BH21 3RD

ANNOUNCING

THE QUILL

FOR THE 48K SPECTRUM AT £14.95

The Quill is a major new utility written in machine code which allows even the novice programmer to produce high speed machine code adventures of superior quality to many available at the moment without any knowledge of machine code whatsoever.

Using a menu selection system you may create well over 200 locations, describe them and connect routes between them. You may then fill them with objects and problems of your choice. Having tested your adventure you may alter and experiment with any section with the greatest of ease. A part formed adventure may be saved to tape for later completion. When you have done so the Quill will allow you to produce a copy of your adventure which will run independently of the main Quill editor, so that you may give copies away to your friends. The Quill is provided with a detailed tutorial manual which covers every aspect of its use in writing adventures.

It is impossible to describe all the features of this amazing program in such a small space, so we hve produced a demonstration cassette which gives further information and an example of its use. This cassette is available at £2.00 and the Quill itself is £14.95.

ALSO NEW FOR THE 48K SPECTRUM:

DIAMOND TRAIL **£4.95**

The latest of our machine code adventures sets you the task of recovering the Sinclive diamond. But first you must overcome many problems in a city fraught with danger and intrigue.

GILSOFT

30 Hawthorn Road, Barry
South Glam CF6 8LE
Tel: (0446) 736369

TELEPHONE YOUR ORDER WITH

Access VISA

OUR SOFTWARE IS AVAILABLE FROM MANY COMPUTER SHOPS NATIONWIDE, OR DIRECT FROM US BY POST OR PHONE. S.A.E. FOR DETAILS. DEALER ENQUIRIES WELCOME. SOME OF OUR MAIN WHOLESALERS ARE:

UK:	PCS Distribution, Darwen, Lancs. Tel (0254) 691211/2
HOLLAND/BELGIUM:	AASHIMA TRADING BV, Hoogstraat 69a, 3011 PH Rotterdam
SWEDEN:	RIKO DATA, Box 2082, S-230 41 Bara, Sweden
DENMARK:	QUALI-SOFT, Vesterbrogade 127 E Mz Tv, 1620 Copenhagen V
SOUTH AFRICA:	UNIVERSAL SOURCES (PTY) LIMITED, Durban, Natal

TASWORD TWO THE WORD PROCESSOR

48K SPECTRUM

64 CHARACTERS PER LINE ON THE SCREEN AND TO PRINTERS!

TASWORD TWO The Word Processor

Your Spectrum becomes a **professional** word processor with TASWORD TWO. TASWORD TWO gives you an amazing **64 characters per line** on your screen. This is ideal for standard A4 paper and TASWORD TWO prints your text just as it appears on your screen.

Tasword Two drives the following interfaces:

Cobra RS232 I/O Port	*Kempston Interface*
Euroelectronics Interface	*Morex Interface*
Hilderbay Interface	*Tasman Interface*

The same program drives these interfaces. A short easy to follow set of instructions takes you through setting up your Tasword Two to drive the interface you have or choose to buy.

Tasword Two also drives the ZX printer.

£13·90 fully inclusive mail order price.

TASWORD TWO TUTOR

TASWORD TWO comes complete with a manual and a cassette. The cassette contains your TASWORD TWO **and** TASWORD TWO TUTOR. This teaches you word processing using TASWORD TWO. Whether you have serious applications or simply want to learn about word processing, TASWORD TWO and TASWORD TWO TUTOR make it easy and enjoyable.

TASWORD TWO £2 Demonstration Cassette

See for yourself the powerful features of TASWORD TWO. Send just £2 for the Tasword Two demonstration cassette. A voucher is included which gives you £1 off the price of TASWORD TWO.

TASWIDE – 64 characters per line!

A machine code utility program, TASWIDE **doubles** the information that your own programs can display. Make a simple change to your print statements and your output appears on the screen at 64 characters per line instead of the normal 32. Both print sizes can be mixed on the screen. 16K and 48K versions supplied on the same cassette.

£5·50 fully inclusive mail order price

TASMAN PRINTER INTERFACE

Plug into your Spectrum and drive any printer fitted with the Centronics standard parallel interface. Supplied complete with ribbon cable, connectors, and driving software.

£45 fully inclusive mail order price

All prices include VAT and post and packaging.

TASMAN SOFTWARE

Dept SU

17 HARTLEY CRESCENT LEEDS LS6 2LL

MEMOTECH

The Complete Range

NEW PRICES UP TO 37.5% OFF PLUS FREE P+P!

Fifteen months ago Memotech developed the first 64K Memopak, designed to maximise the capabilities of the Sinclair ZX81. Since then, using the ZX81 as a starting point, we've gone on to produce a comprehensive range of Memopaks, adding 16K and 32K memory expansions, utilities packages comprising a Word Processor, Z80 Assembler and Spreadsheet Analysis, plus Communication Interfaces, High Resolution Graphics and a professional quality Keyboard.

To complete our range of ZX81 add-ons, we are now introducing the MEMOPAK RS232 Serial Interface.

RS232 Interface

The RS232 is an all-purpose interface which allows the ZX81 not only to output to suitable serial printers, but can link up with numerous types of peripheral or even other processors. The Interface has two main modes of operation: BASIC mode allows you to use the range of functions supplied in the RS232 EPROM within an ordinary BASIC program, and TERMINAL mode allows you to use your ZX81 as a terminal to another processor.
The EPROM functions offered permit the user to send, receive and convert bytes between ZX81 code and ASCII, as well as check the status of numerous control flags. Received or transmitted data can appear simultaneously on the screen, and received data may be printed simultaneously.

£39.95 inc. VAT

Memopak Centronics I/F

The BASIC commands LPRINT, LLIST and COPY are used to print on any CENTRONICS type printer. All ASCII characters are generated and translation takes place automatically within the pack. Reverse capitals give lower case. Additional facilities allow high resolution printing.

£24.95 inc. VAT

Memopak HRG

This pack breaks down the constraints imposed by operating at the ZX81 character level and allows high definition displays to be generated. All 248 × 192 individual pixels can be controlled using simple commands, and the built in software enables the user to work interactively at the dot, line, character, block and page levels.

£29.95 inc. VAT

Memocalc

The screen display behaves as a 'window' on a large sheet of paper on which a table of numbers is laid out. The maximum size of the table is determined by the memory capacity, and with a Memopak 64K a table of up to 7000 numbers with up to 250 rows or 99 columns can be specified.

£29.90 inc. VAT

Memotext

Text is first arranged in 32 character lines for the screen with comprehensive editing facilities. On output the user simply chooses the line length required for printing and the system does the rest. Used with the Memopak Centronics Interface, the Word Processor makes available printout with 80 character lines, upper and lower case and single and double size characters.

£29.90 inc. VAT

Memopak Memory Extensions

For those just setting out on the road to real computing, these packs transform the ZX81 from a toy to a powerful computer. Data storage, extended programming and complex displays all become feasible. Further details available on request.

16K Memopak £24.95 32K Memopak £34.95
64K Memopak £49.95 Prices inclusive of VAT

MEMOPAKS ARE AVAILABLE AT MAIN BRANCHES OF WH SMITH and JOHN MENZIES

Z80 Assembler

The Assembler allows you first to code and edit a source program in the Z80 language, and then assemble it into machine code. You can now write flexible and economic programs. The Editor mode allows you to code directly in the right format, manipulate individual lines and control the exact placing of source and machine code. Routines may be merged or listed (even to a commercial printer using our Centronics Interface). The assembler mode handles all standard Z80 mnemonics, numbers in hex or decimal, comments and user-selected labels.

£29.90 inc. VAT

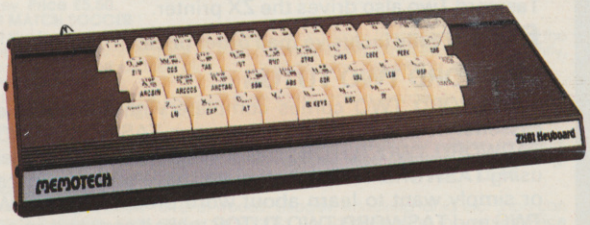
Memotech Keyboard

The Memotech plug-in Keyboard plus buffer pack takes the effort out of data entry for ZX81 users. The Keyboard has a light professional touch and is housed in an elegant aluminium case. The simple plug-in system means that you are not obliged to open up your ZX81, use a soldering iron or invalidate your ZX81 warranty.

Keyboard Buffer Pak

The Buffer Pak performs a "housekeeping" function for the Keyboard, interfacing directly with the port of your ZX81.

£34.95 inc. VAT



All Prices are inclusive of VAT, postage and packing.

To Order: Send your Name, Address, Memopaks required, plus a Cheque/Postal Order/Access/Barclaycard number (please state which) to: Memotech Limited, Station Lane Industrial Estate, Witney, Oxon. OX8 6BX. Telephone Witney 2977

We want you to be completely satisfied with your Memopak – all our products carry a 14 day money back guarantee.

According to Jack Knight, the Spectrum can be persuaded to produce almost eighty colours including grey and orange.

Shades of success from defining graphics

WHO WAS IT who said the Spectrum had eight, not even nine, but eight colours? Whoever it was was wrong. As wrong as saying butterflies are all the same. The Spectrum produces nearer to 80 than eight colours — a brilliant orange, striking new shades of red, green, blue. Even greys and browns.

The ticket to a new world of colour is a user-defined graphic. It will be easier to describe its use once it has been set up. So:

Before NEW-ing — as you know, the graphic will remain until the micro is turned off — check, by going into graphics mode and pressing "P", that you have a miniature chequer-board. INK will be applied to the 1s and PAPER to the Os to mix the new colours.

The first program streaks the new colours across the screen in varying widths. The choice of INK and PAPER is random. With regard to the listing, you will see that it is not necessary to use the INT function with RND for INK and PAPER as they round to the nearest whole number. In ensuring that the numbers — and thus INK and PAPER — are not the same it is necessary — line 20 — to add .5 and INT, as rounding-down only would not be very useful, nor would comparing numbers such as .0011182370 and 0.82150369.

The random variable C sets the width of the colour band. The POKE in line 90 sets automatic scrolling.

The next program, be assured, is easier on the eyes if not on the mind. How good are you at deciding, when shown two colours, what the result of the mix will be? With the next program you can learn.

If your want to look longer at a particular mix there is just time after the warning beep to operate BREAK.

> 'The Spectrum will go through the colours and mix them with each other'

The A-loop sets in turn the INK numbers 1 to 6 while the B-loop sets against each the PAPER numbers, always one more so there is no duplication of INK and PAPER or a repeat of mixes already shown. The PAUSE in line 80 holds down INKEY to prevent it flashing across the keyboard without giving you time to call-up the answer, let alone try your own first. Line 100 allows for miskeying.

Now for the full range of colours of which the Spectrum is capable. Not only will black and white be included but also BRIGHT which produces its own distinct hues.

The next program will first print the two basic colours the micro has been told to select, together with their numbers on the keyboard. The screen will begin to fill rapidly with the result of the merging. Then halfway down BRIGHT will be switched on, so that not only can a fresh tint be seen, but the marked difference between BRIGHT 0/1 can be compared.

The Spectrum will go through the colours on the keyboard and mix each with all the others — duplications have been written out. Again there is a brief pause after the warning beep if you want to hold a screen.

The number of newly-created colours the Spectrum produced was 56 — that is 28 plus 28 with BRIGHT on.

Although it has been entertaining to see the colour capability of the Spectrum, can the new colours be used in graphic displays? The answer must be a qualified yes. Some of the new colours tend to be unstable in that they do not seem to be able to stay still. Also, as the Spectrum can display only two colours to a character square there would be difficulties if something with curved lines were set against, for instance, a blue sky.

The edges of the graphics would be showing the PAPER colour, so that an orange sun would be fixed within a frame of red or yellow. That problem would disappear if the graphic allowed for the PAPER to match the background. Graphics composed of complete squares such as tower blocks of sales figures for each month should certainly be possible using the new colours.

The Spectrum has an astonishing array of colours, as we have proved — considerably more than eight — but the question remains as to who said the Spectrum had eight colours?

```
  1 REM LISTING 1.
 10 LET A=BIN 10101010: LET B=B
IN 01010101
 20 FOR X=0 TO 7
 30 READ D: POKE USR "P"+X,D
 40 NEXT X
 50 DATA A,B,A,B,A,B,A,B


  1 REM LISTING 2.
  2 REM ***STREAKER©***
 10 LET A=RND*7: LET B=RND*7: L
ET C=INT (RND*3+1)
 20 IF INT (A+.5)=INT (B+.5) TH
EN GO TO 10
 30 FOR J=1 TO C
 40 FOR K=0 TO 31
 45 REM GRAPHICS "P"
 50 PRINT INK A; PAPER B;"▒";
 60 NEXT K
 70 NEXT J
 85 REM AUTOMATIC SCROLLING
 90 POKE 23692,-1
100 GO TO 10


  1 REM LISTING 3.
  2 REM ***TESTCARD©***
  5 BORDER 2
 10 PRINT '' TAB 5; BRIGHT 1;"C
AN YOU MIX COLOURS?"
 20 PAUSE 50
 30 FOR A=1 TO 6
 40 FOR B=A+1 TO 6
 50 PRINT AT 7,4;"THEN WHAT DO
THESE MAKE"
 60 PRINT TAB 1;"(WHEN READY-PR
ESS ""Y"" TO SEE)?"
 70 PRINT ' TAB 12; INK A;"▒▒▒"
; INK 0;"+"; INK B;"▒▒▒"
```

```
 80 PAUSE 9999
 85 REM GRAPHICS ARE "P"
 90 IF INKEY$="Y" THEN PRINT TA
B 15;"↑";TAB 12; INK A; PAPER B;
"▒▒▒▒▒"
100 IF INKEY$<>"Y" THEN GO TO 8
0
110 PAUSE 100
120 BEEP .1,0
130 PAUSE 100
140 CLS
150 NEXT B
160 NEXT A
170 FOR A=1 TO 10
180 BORDER RND*6
190 BEEP .1,A: BEEP .1,10-A
200 NEXT A


  1 REM LISTING 4.
  2 REM ***MIXER©***
 10 FOR A=0 TO 6
 20 FOR B=A+1 TO 7
 30 PRINT A;">"; INK A;"▒"; INK
0;"+";B;">"; INK B;"▒"; INK 0;"
(BRIGHT 0/1) ="
 40 FOR X=1 TO 672
 45 REM GRAPHICS "P" & ";"
 50 PRINT INK A; PAPER B;"▒";
 60 IF X=336 THEN BRIGHT 1
 70 NEXT X
 80 PAUSE 100
 90 BEEP .1,0
100 PAUSE 100
110 CLS : BRIGHT 0
120 NEXT B
130 NEXT A
140 FOR A=10 TO 1 STEP -1
150 BEEP .1,A: BEEP .1,A*2
160 NEXT A
```

"ADVENTURES IN

AVAILABLE FROM W.H. SM TH
AND ALL LEADIN OM

Transylvanian Tower

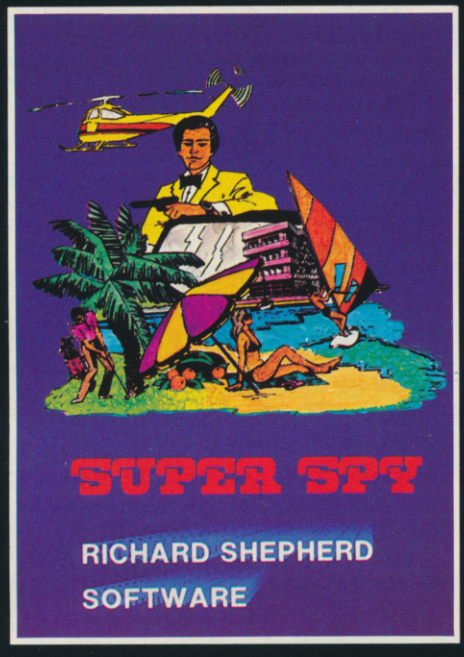
A spine chilling adventure... enter via the dungeons ... navigate your way through 500 3-D rooms ... survive the swooping vampire bats ... reach the terrifying top ... confront and kill Count Kreepie, ridding the world of this Transylvanian Terror.

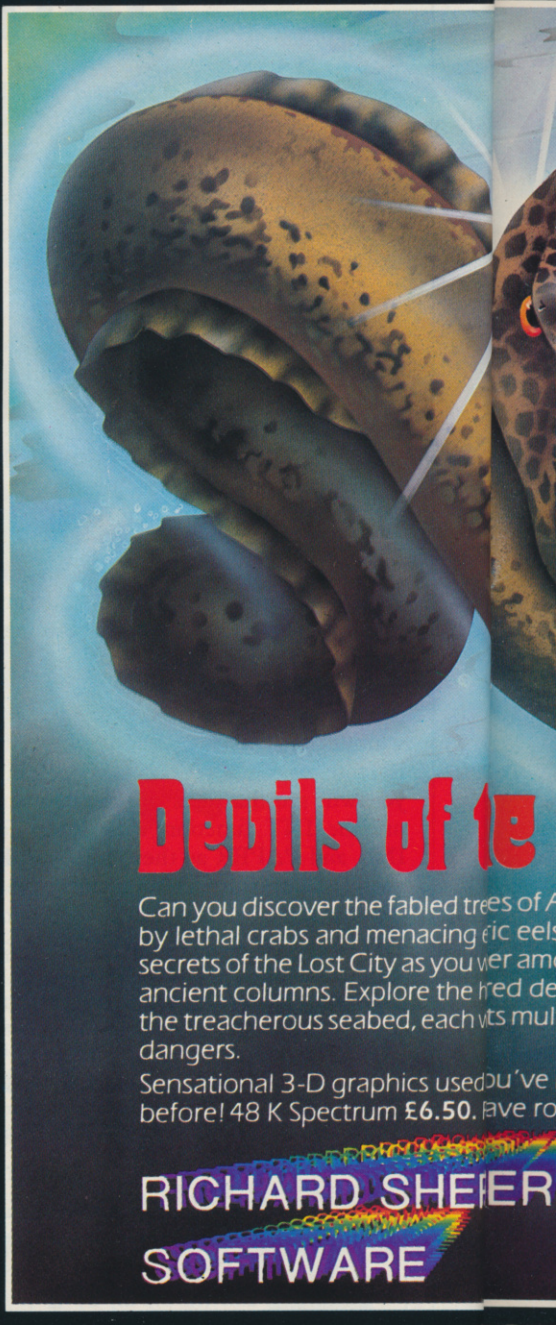
Can you survive the Top of the Tower? Full save routine for use during the hours of darkness! 48K Spectrum **£6.50**

Super Spy

Locate the secret island hideaway of the mysterious meglomaniac Dr. Death. Follow his trail across continents, through complex puzzles and 3-D mazes. Discover the entrance to his underground lair — but beware — even with your death-defying gadgets his evil henchmen may still win the day!

With save routine for part time secret agents! 48K Spectrum **£6.50**





DEALERS — GENEROUS DISCOUNTS AVAILABLE CO CT

RICHARD SHEPHERD SOFTWARE

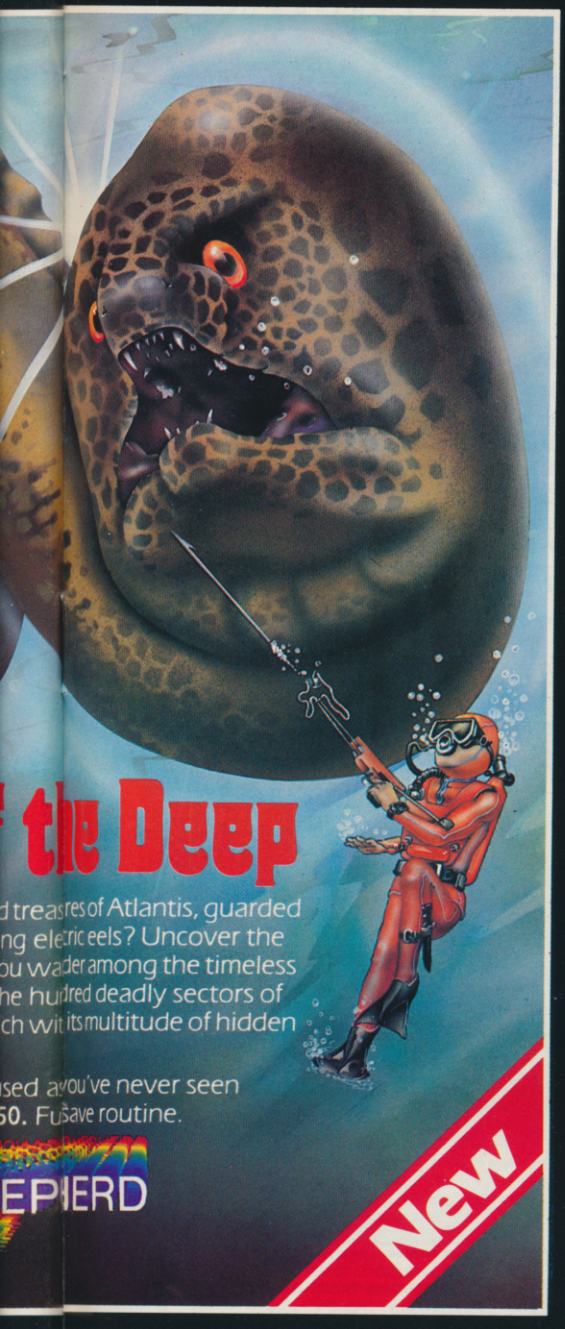
ELM HOUSE, 23-25 ELMSHOTT LANE, CIPPENHAM, SLOUGH, BERKSHIRE.

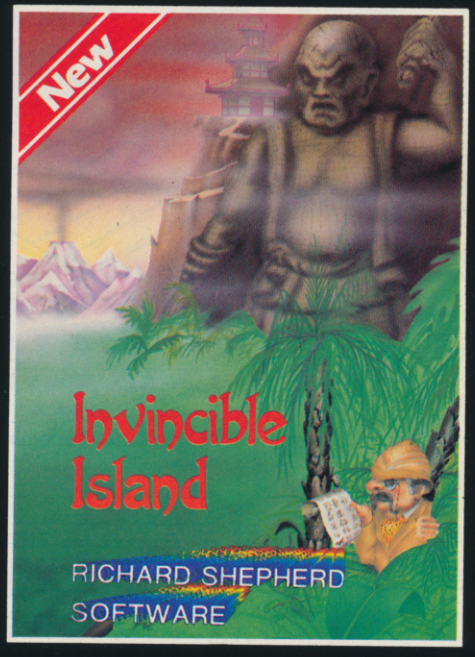
CREDIT C HO
RING (6) 63
FOR EX S SER

All programs are sold subject to the condition that they may not, by way of trade or otherwise, be le out, re

NTO IMAGINATION"

SMITH, JOHN MENZIES, BOOTS*
ING COMPUTER STORES

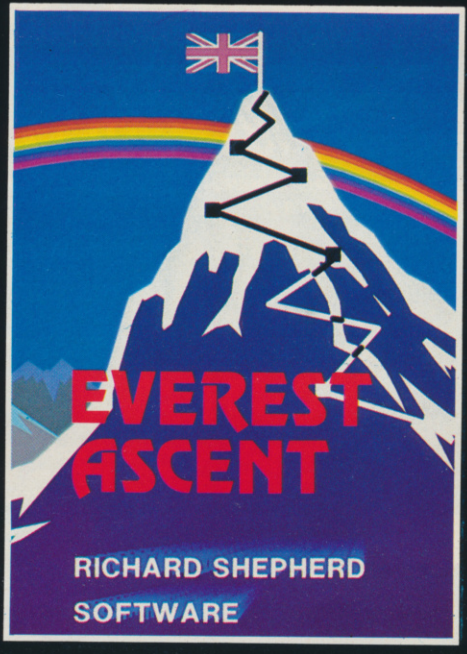




Invincible Island
by Peter Cooke

Exhaust your ingenuity in the quest to find The Seven Parchments of Xaro and their meaning! Will they lead you to undreamt of treasures or eternal doom? Explore the mysteries of the stockade and puzzle within the Pagoda! A spectacular split screen graphic and text adventure to braintease you for weeks!

Adventurous graphics for every location. Save routine. 48K Spectrum **£6.50.**



Everest Ascent

Stake your claim to the top of the world in this strategic vertical adventure. Conquer the summit of the world's highest peak! . . . struggle from base camp to base camp . . . survive the elements . . . watch out for avalanches, thin ice and wayward sherpas . . . encounter abominable snowmen and cross bottomless crevasses!

A game of skill, strategy and planning — a graphic simulation of man's ultimate endeavour! Save routine. 48K Spectrum **£6.50.**

ONTACT JOHN SALTHOUSE ON (06286) 63531 FOR DETAILS

T CAD HOTLINE
G (0628) 63531
EXPRESS SERVICE

RICHARD SHEPHERD SOFTWARE

ELM HOUSE, 23-25 ELMSHOTT LANE, CIPPENHAM, SLOUGH, BERKSHIRE.

be lent, hd out, resold or otherwise circulated without the written permission of Richard Shepherd Software Ltd.

* Selected titles available at larger branches

SPECTRUM OWNERS
WHY GET FLEECED?

k-ram

WON'T PULL THE WOOL!
WE JUST SUPPLY THE BEST

FOR 16 OR 48K

TITLE	PRICE
JET PAC	£5.50
CYBER RATS	£5.95
BLACK HOLE	£5.50
INVADERS	£4.95
PSSST	£5.50
SLIPPERY SID	£5.95
TRANZAM	£5.50
PLANET OF DEATH	£6.95
JUMPING JACK	£5.50
LIGHT CYCLES	£4.95
VIOLENT UNIVERSE	£5.50
COOKIE	£5.50
E.T.X.	£5.95
ARCADIA	£5.50
NIGHTFLITE	£5.95
3D TUNNEL	£5.95

FOR 48K ONLY

TITLE	PRICE
HOBBIT	£14.95
MAD MARTHA	£6.95
PENETRATOR	£6.95
3D COMBAT ZONE	£5.95

NEW RELEASE
The ZX Printout Binder. A smart heavy gauge red PVC Leatherette Binder custom built for your printouts. Complete with 10 heavy gauge clear PVC sleeves £7.50 inc. P&P.

THE k-ram DEAL:

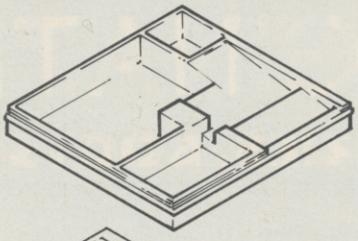
1. 50p Voucher with every item.
2. All prices include Post & Packing.
3. All tapes checked by Quality Department before dispatch.

PLEASE NOTE
All Cheques with Bankers Card Nos and Postal Orders dispatched same day.

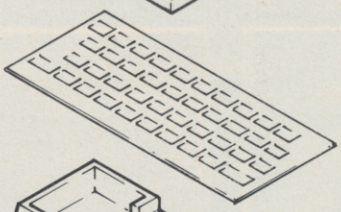
15 DANBURY ROAD, RAINHAM, ESSEX RM13 7UR
TEL: (04027) 55629

SPECTRUM ..... PRODUCTS

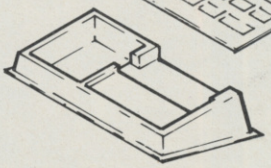
G·CHAPMAN LTD·



MICRO·TIDY
Designed for ease of use. Space for SPECTRUM, power·pack, recorder, cassettes, microdrive or printer. Space at rear of SPECTRUM for add·ons and ZX Interface, complete with lid. £22:45



KEYBOARD OVERLAYS
Pack of TEN overlays for the SPECTRUM (plain) size·225×95. ..... £2:20



MICRO·CONSOLE
Designed for easy use. Space for SPECTRUM and microdrive or printer. Space to SPECTRUM rear for add.ons and ZX Inteface £7:50
with lid £9:75

SPECTRUM ..... PRODUCTS

Post to G.Chapman.Ltd. Station Road Industrial Estate, Whittlesey, Nr.Peterborough, Cambs. PE7 2EY

MICRO·TIDY £22:45
KEYBOARD OVERLAYS £2:20
MICRO·CONSOLE £7:50
CONSOLE·· ·WITH LID ·· £9:75

Name: _____
Address: _____

All prices include VAT, P&P. Overseas orders add 25% additional mail.

SPECTRUM ..... PRODUCTS

Turn 1 Ram 64 into a massive 256K of memory in 4 moves!

JUST 10 REASONS WHY YOU NEED A ZX81 PERSONA

1. Facility to reset a crashed system without pulling the plug.
2. Extra lines for one megabyte expansion.
3. Din 41612 standard connector. Perfect contacts for 64 gold-plated connections.
4. Gold-plated connector for firm connection to the ZX81.
5. Reliable power connection plus battery back-up points for failsafe operation.
6. Controller to co-ordinate all peripherals.
7. Circuitry to supervise and maintain memory add-ons.
8. Power drivers to minimise loading on ZX81. More expansion with no troubles.
9. Extra sources of power supplies to eliminate overheating on the ZX81.
10. 4" of high quality ribbon cable at no extra cost.

ORGANIC MICRO – YOUR KEY TO THE TOWER OF POWER –
ORGANIC MICRO is a Building Block system. Each module plugs into each other giving you a complete (and modular) range of options. Each module performs its own function or works in conjunction with each other to provide integrate functions. Of course, in order to achieve this you need the right "Foundations". The foundation is the direct interface which we call PERSONA; it is the "Brains" of the whole operation and simply plugs into your Computer. Thereafter, any upgrade facility you need is neatly stacked into the PERSONA, either permanently or when required. In short, an ORGANIC MICRO will save you forever, no matter how big you want to grow.

HOW TO ORDER
To purchase any of the above items, please fill in the coupon below with your name and address enclosing your cheque or Postal order. Should you need any further information you may telephone us during normal working hours, send for our Brochure, or enquire at GREENS, DIXONS, W. H. SMITH or BOOTS.
Move into the Computer world with ORGANIC MICRO – ORDER NOW!

BASICARE MICRO SYSTEM

BASICARE MICROSYSTEM LTD., 12 RICKET STREET, LONDON SW6 1RV. TEL: 01-385 2135.

You simply chose the following modules you want and plug them in to the PERSONA and turn your ZX81 or ZX SPECTRUM into a total Computing package.

PERSONA ZX81	£30.25
PERSONA ZX SPECTRUM	£45.00
RAM 08 (2K)	£24.50
RAM 16	£26.75
RAM 64	£76.25
MINIMAP	£35.95
DROM (2k)	£39.50
TOOLKIT	£22.20
PERICON a	£27.90
PERICON b	£33.75
PERICON c	£41.75
SONUS	£30.15
Options: USE FONT	£8.00
Additional 2K for RAM 08	£6.50
Additional 2K from DROM	£7.50

Prices include VAT Postage and Packing for U.K. deliveries. Overseas Orders please add 15% to price for surface mail.

Post to: BASICARE MICROSYSTEM LTD
12 RICKET STREET, LONDON SW6 1RV. Tel: 01-385 2135
Please send me your brochure, I enclose a large stamped addressed envelope.
I would like to purchase the following items; (please state item and No. of items required from the list above).

.....

.....

I enclose cheque/P.O. for £.....
NAME: .....
COMPANY: .....
ADDRESS: .....

.....

.....

Tel: (Day)..... Tel: (Eve).....

BRIDGE SOFTWARE

THE NIGHT SKY

(for Sinclair Spectrum 16k)

An observer's guide to the stars visible from the UK (48 to 58 North)

Discover the fascination of the limitless heavens.

Create brilliant hi-res starcharts with THE NIGHT SKY and your Spectrum

- Features over 700 different stars
- 5 magnitudes distinguished
- 50 constellations identifiable
- Over 4 million different skyscapes
- Sky colour indicates day, night or twilight
- Ideal for serious astronomers and novices alike
- Make your TV screen a mini planetarium

Trace the movements of the constellations minute by minute, night by night

Send £8.90 for cassette and Manual

Send s.a.e. for full list of our scientific educational, graphics and games software for Spectrum, ZX81, BBC and VIC-20

Full money back guarantee.

Trade enquiries welcome

Dept SU, 36 Fernwood, Marple Bridge, Stockport, Cheshire, SK6 5BE, England.

SOFTWARE LIBRARY

FOR

SPECTRUM

Low cost weekly hire of the best arcade games, adventures, utilities, languages and business programs.

- Membership only £6.00 for 12 months.
- Program hiring from only 80p (plus 25p p&p).
- Free fully descriptive catalogue for members.
- New titles constantly being added.
- Purchase new programs at discount prices.
- Return of post service.
- All tapes despatched using first class post.
- We have full permission and licences from the leading software publishers, to whom royalties are paid.

Compare these features with our competitors and you will see why more Spectrum owners are joining the Kernow Software Library. Join today by clipping the coupon below or send a S.A.E. for further details.

☐ YES, please send me my free catalogue and selection sheet. I enclose my £6 cheque/Postal Order.

NAME .....

ADDRESS .....

.....

..... TEL .....

Send to:

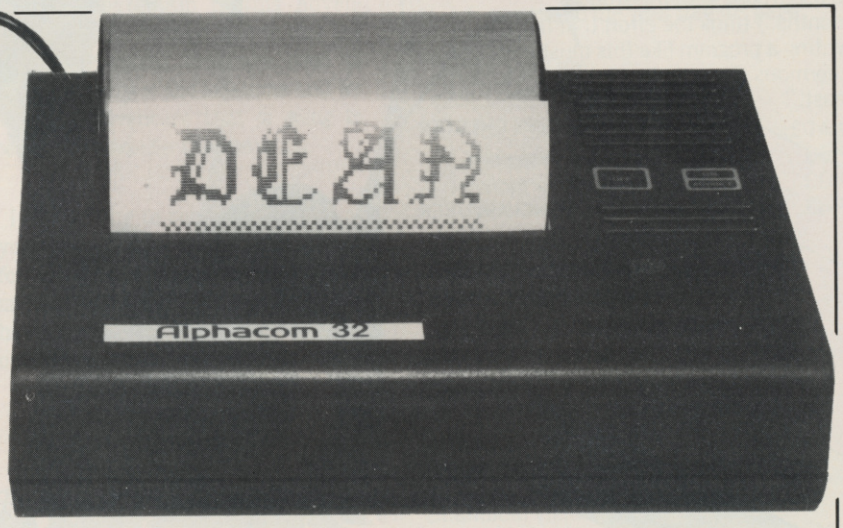
KERNOW SOFTWARE LIBRARY

(Dept. SU)

55 ELIOT DRIVE, ST GERMANS

SALTASH, CORNWALL PL12 5NL

Spectrum compatible printer



- ★ Obeys standard Spectrum commands.
- ★ Printing speed 120 lines per minute maximum.
- ★ Low cost paper supply.
- ★ Price includes power supply and interfacing.

This thermal printer, now available in the U.K., is the standard printer used with the American version of the ZX81. The printer plugs direct into the Spectrum but has a through port allowing the use of additional hardware through the same connector.

The size of the printer is 7¼ x 5¼ x 3½ ins. attractively packaged in a moulded matt black plastic case.

A separate power pack is supplied in a 2½ x 3½ x 2¼ ins. case.

Two switches mounted on the printer allow for on/off switching and also access to the test mode and paper advance commands.

The printing speed in the self test mode is 120 lines per minute.

The paper rolls are 4¼ ins. wide and 25 metres in length.

£99·95 **Price includes - Printer, power supply, full interfacing, one roll of paper, VAT and p&p.**

Please send me ..... Printer(s) at £99.95 each.
..... boxes of Paper (10 rolls per box) at £12 per box (incl. VAT, p & p).
Total £ .....
Cheque/PO made payable to: Dean Electronics Ltd.
Delivery 14 days allow 28 days max.

Credit card facilities for telephone orders.

DEAN ELECTRONICS LIMITED

Glendale Park Fernbank Road Ascot Berkshire England

Telephone Winkfield Row (0344) 885661 Telex 849242

DEALER ENQUIRIES INVITED.

The Hobbit. More of an experience t

"After a very short time I found that 'The Hobbit' was becoming almost a way of life rather than a game, and so when I finished it for the first time I was partly sad because I felt that all the fun and adventure had ended, but I was wrong. Even now I am discovering new things about the game and feel that it will be some time until all of its secrets are revealed to me."

MR. J. STERN, Herts

"I have at last received your 'Hobbit' program and would like to congratulate you on its excellence. After four days of sweat and tears I have completed only 37.5 per cent of the adventure. The program has lived up completely to expectations, and there is no doubt about it being the best production for the Spectrum to date. You have surpassed all others with your program."

"A lot of fun."

COMPUTI

"The excellent gra
The exciting differ
is that it is possibl
converse with all t
meet and ask their
recommend this g
Tolkien, or novel a

POPULAR COMP

"I am writing to co
'Hobbit'. I think it is one of
ingenious programs I have
to use. It has kept me stump
months. I think the effort th
writing a program like this must have be
enormous. The effects are brilliant to say th
least."

JEREMY CHESTER

"Th bit takes first place in the new
quality and value for money."

SINCLAIR USER

cations in the Adventure are
ne excellent graphics. We
mplete 7.5
of

ures. The
ied plot
erior to any
for the

COMPUTER

misty Mountains
e, this game is
reat to play and is No. 1 for
and excitement."

GORDON DEMPTSTER, Scotland

"Thanks again for an excellent game in 'The Hobbit'. I feel I have really got my money's worth out of playing time. Congratulations!"

MR. P. RUSHTON, Leeds

"The most powerful computer game yet invented."

COMPUTER WEEKLY

"Within my circle of friends this game has become something of an obsession. We meet every Friday night at someone's house and spend 3-4 hours on 'The Hobbit'. Friday night would not be the same without 'The Hobbit'."

CHRISTINE VERCHILD, Wilts

"One new Adventure game stands head and shoulders above the rest. It alone almost provides you with a good enough reason to buy a 48K Sinclair Spectrum. Not only does The Hobbit produce drawings of the main scenes, but it also understands proper sentences rather than pairs of words for its commands. It comes with a copy of J.R.R. Tolkien's classic book of the same name. It is the program with the most detailed and best written documentation ever."

WHAT MICRO

"This is an impressively packaged Adventure game which makes good use of the Spectrum's colour graphics. They have not only produced one of the best games for the Spectrum, but given everyone else a lesson in good game design."

PRACTICAL COM

"I am the owner of a copy of 'The Hobbit' which is wonderful entertainment, and very challenging. I have other tapes and publications of yours, all of which are excellent."

MR. D.J. BURGH, Kent

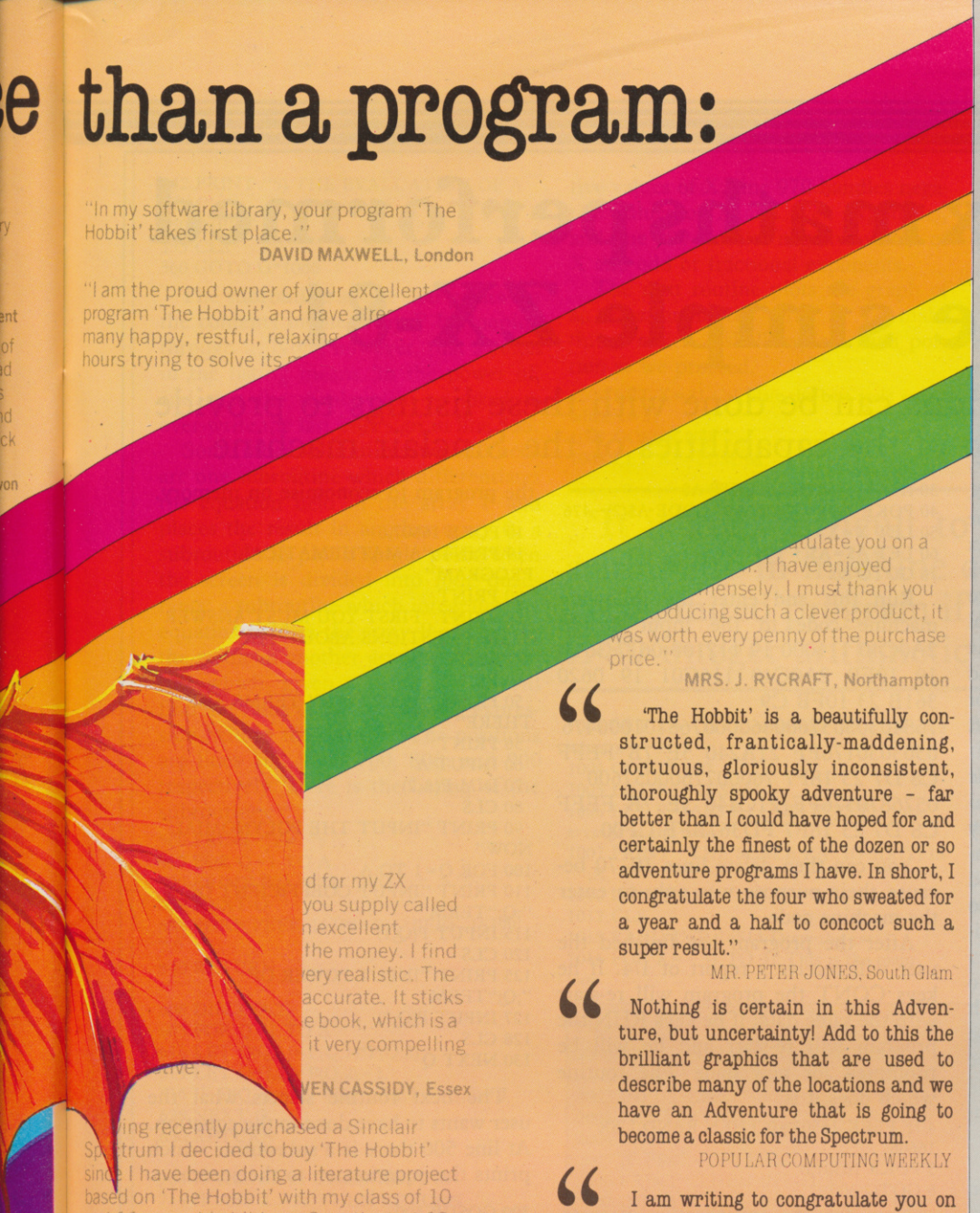
"Having received the most excellent piece of programming I have ever seen, we have had no social life whatsoever. 'The Hobbit' has been dominating our lives since January and many nights have been spent until 3 o'clock trying to conquer it."

SIMON ROGERS, Avon

"I have recently purchased your excellent adventure game 'The Hobbit'. This g
greatly enhanced by the use of
graphics, its availability in t
originality of having t
ly to

Melbourne House

than a program:



"In my software library, your program 'The Hobbit' takes first place."
DAVID MAXWELL, London

"I am the proud owner of your excellent program 'The Hobbit' and have alre... many happy, restful, relaxing... hours trying to solve its ..."

...tulate you on a ... I have enjoyed ...mensely. I must thank you ...oducing such a clever product, it ...was worth every penny of the purchase price."
MRS. J. RYCRAFT, Northampton

...d for my ZX ...you supply called ...n excellent ...the money. I find ...ery realistic. The ...accurate. It sticks ...e book, which is a ...it very compelling ...tive."
...VEN CASSIDY, Essex

"...ing recently purchased a Sinclair Spectrum I decided to buy 'The Hobbit' since I have been doing a literature project based on 'The Hobbit' with my class of 10 and 11 year old children. Over the last 10 weeks the children, having read the book, have been attempting the program with my assistance. Let me congratulate you on a most entertaining program."
MR. K. REID AND CLASS 7, Nottingham

"...more of an experience than a program!"
POPULAR COMPUTING WEEKLY

"... the most unique factor of this program is that the user instructs the computer in completely ordinary English sentences. The Hobbit program is capable of very sophisticated communications ..."
ZX COMPUTING

"I purchased 'The Hobbit' not long ago and since then I have been engrossed in the game, and I'm beginning to think no-one wants to talk to me as all I talk about is my adventures in, 'The Hobbit'."
DAVID ROWLEY, Stoke-on-Trent

"The use of graphics is one of the features which makes The Hobbit special. The addition of graphics as good as these adds a whole new dimension to the Adventure. It is certainly a marvellous game, which should set the standard for future Spectrum adventures."
ZX COMPUTING

"'The Hobbit' is a beautifully constructed, frantically-maddening, tortuous, gloriously inconsistent, thoroughly spooky adventure – far better than I could have hoped for and certainly the finest of the dozen or so adventure programs I have. In short, I congratulate the four who sweated for a year and a half to concoct such a super result."
MR. PETER JONES, South Glam

"Nothing is certain in this Adventure, but uncertainty! Add to this the brilliant graphics that are used to describe many of the locations and we have an Adventure that is going to become a classic for the Spectrum."
POPULAR COMPUTING WEEKLY

"I am writing to congratulate you on your excellent program 'The Hobbit' for the Spectrum. I wake up in the middle of the night with an idea and have to load the adventure to try it out."
MR. PHILLIP DARLING, Suffolk

"A most impressive package."
DAILY EXPRESS

"...we are not eating food...we are losing sleep...and it's great! I reckon you can guess why. We are lost, completely and utterly lost, in the Hobbit program."
MR. JOHN HARRIS, Kuwait

"...one of the most complex games for the Sinclair machines I have seen..."
SINCLAIR USER

Orders to:
131 Trafalgar Road,
Greenwich, London SE10

Correspondence to:
Melbourne House,
Church Yard, Tring,
Hertfordshire HP23 5LU

All Melbourne House cassette software is unconditionally guaranteed against malfunction.

Trade enquiries welcome.

☐ Please send me your free 48 page catalogue.
Please send me:

48K SPECTRUM

- ☐ The Hobbit £14.95
- ☐ Penetrator £6.95
- ☐ Terror-Daktil 4D £6.95
- ☐ Melbourne Draw £8.95

£ .....

Please add 80p for post and pack £ .....

TOTAL £ .....

I enclose my ☐ cheque
☐ money order for £ .....

Please debit my Access card No. .....

.....

Expiry Date .....

Signature .....

Name .....

Address .....

.....

.....

..... Postcode .....

SU10B

Access orders can be telephoned through on our 24-hour ansafone (01) 858 7397.

Complex maths performed by the simple ZX-81

Complicated calculations can be done with these listings to provide a useful expansion of the capabilities of the Sinclair machine

THIS IS a program for the 16K ZX-81 which will enable the user to perform some complex mathematical calculations, aided by a graphical display. It would be able to find at least one root for a polynomial equation of any degree and at the same time plot the graph of the equation, find the definite or indefinite integral, or differentiate the equation with respect to X.

The program is almost entirely Basic with only a few machine code subroutines. The reason is that it is very difficult to handle floating point arithmetic in machine code and it would be a very limited program if it were only to use the Z-80 integer arithmetic facilities.

I have subdivided the program into several routines; I shall explain each individually so that the program can be understood easily. Here is a list of these routines:

Line 1 — Various machine code subroutines, stored in a REM statement.
Lines 4 to 6 — The re-start routine.
Lines 10 to 130 — The initialisation process.
Lines 300 to 360 — The select routine.
Lines 500 to 996 — Some important subroutines.
Lines 1000 to 1180 — The graph plotting routine.
Lines 2000 to 2310 — The equation-solving routine.
Lines 3000 to 3090 — The differentiation routine.
Lines 4000 to 4340 — The integration routine.
Lines 5000 to 5120 — The Sigma evaluation routine.

All the machine code subroutines do is draw things on the screen. Do not worry if you do not understand them; they are not an important part of the program and their functions could easily be replaced by longer and less efficient Basic subroutines. The first thing to do is type:

```
1 REM 110 characters.
```

Then enter this Basic program:

```
10 LET X=16514
20 INPUT A$
30 IF A$="" THEN INPUT A$
40 POKE X,16*CODE A$+CODE A$(2)-476
50 LET X=X+1
60 LET A$=A$(3 TO)
70 GOTO 30
```

Run this and enter the following machine code to the input string:

```
2A0C40 111000 19 112100 0617 361B
19 10FB 2A0C40 116C01 19 0620
361B 23 10FB C9
76840303057600860000768701000476
0303030176FF 21A240 5E 7B FEFF
C8 D7 23 18F7 7600077600057600
0576870576FF 21C440 5E 7B FEFF
C8 D7 23 18F7 FD367BFF CF00.
```

You can then delete lines 10–70 because their purpose was only to enter the machine code.

After the program has finished the user will receive a report of 1/4. If he keys CONT the program will re-start with the same data; if he keys RUN the program will re-start and he will be prompted for new data. The routine which does it is:

```
4 IF PEEK 16507=0 THEN RAND USR
16606
5 POKE 16507,0
6 GOTO 300
```

Now for the initialisation process. The equation will store the coefficients of X^n in the array P(n,1) and the corresponding exponents in the array P(n,2). When entered into the computer, an equation must be of the form Y = polynomial in X. When the equation is being solved for an unknown, x, Y must be equal to nought, and during Sigma evaluation Y should be ignored altogether.

You will notice that I have used Q as the control variable in the FOR-NEXT loop. I have done so in all my loops in the program to economise on memory.

```
10 POKE 16507,0
19 PRINT "A MATHEMATICAL
PROGRAM"
20 PRINT
30 PRINT "FIRST YOU MUST ANSWER
SOME QUESTIONS ABOUT THE
EQUATION"
40 PRINT
50 PRINT "HOW MANY TERMS ARE
THERE"
56 PRINT
60 INPUT A
70 DIM P(A,2)
80 CLS
90 PRINT "INPUT THE POLYNOMIAL
NOW"
100 FOR Q=1 TO A
110 PRINT "INPUT COEFFICIENT OF
";Q;"TERM"
115 INPUT P(Q,1)
120 CLS
125 PRINT "INPUT POWER OF
";Q;"TERM"
127 INPUT P(Q,2)
128 CLS
130 NEXT Q
```

The next routine selects what the user wants to have done to the equation. At line 500 there is a subroutine which prints the equation on to the screen.

```
300 GOSUB 500
302 PRINT
303 PRINT
304 PRINT "DO YOU WANT"
305 PRINT
310 PRINT "1) A GRAPH OF THE
EQUATION"
315 PRINT
320 PRINT "2) A ROOT OF THE
EQUATION WHEN Y=0. I.E. A
SOLUTION FOR A POLYNOMIAL
EQUATION"
325 PRINT
330 PRINT "3) THE DERIVATIVE"
335 PRINT
340 PRINT "4) THE INTEGRAL"
341 PRINT
```

$$\frac{-b \pm \sqrt{b^2-4ac}=x}{2a}$$

$$x_{n+1}=x_0-\frac{f(x_n)}{f'(x_n)}$$

$$x^2-10x+25=9$$
$$x^2-10x+16$$
$$=0;$$
2260 GOTO
2120

B.K

```
342 PRINT "5) THE EVALUATION OF A
SUM"
350 INPUT G
353 CLS
360 GOTO G*1000
```

The subroutine at line 500 prints-out the contents of the array P by looping through it. Note, however, that a colon in the listing means 'to the power of' and that the display file is poked to over-write the last plus sign in line 535.

Some other subroutines we will need are one subroutine which differentiates the equation held in the array P and places the result in another array 0; a subroutine to plot a single point when the screen is divided into four quadrants; a subroutine which integrates the equation held in the array P and places the result in another array I; a subroutine which, given a value for X, will find the value of the polynomial expression held in the array P. The positions are lines 500, 600, 700, 800, and 900 respectively. Here is the listing of the subroutines:

```
500 PRINT "Y= ";
510 FOR Q=1 TO A
520 PRINT P(Q,1);"X:";P(Q,2);" + ";
530 NEXT Q
535 POKE PEEK 16398+256*PEEK 16399-
2,0
540 RETURN

600 DIM O(A,2)
605 FOR Q=1 TO A
610 LET O(Q,1)=P(Q,1)*P(Q,2)
615 LET O(Q,2)=P(Q,2)-1
616 IF O(Q,2)=-1 THEN LET O(Q,2)=0
620 NEXT Q
630 RETURN

700 IF ABS S>21 THEN RETURN
715 IF ABS X>31 THEN RETURN
730 PLOT X+31, S+21
760 RETURN

800 DIM I(A,2)
810 FOR Q=1 TO A
820 LET I(Q,2)=P(Q,2)+1
830 LET I(Q,1)=P(Q,1)/I(Q,2)
840 NEXT Q
850 RETURN
900 LET SUM=0
910 FOR Q=1 TO A
920 IF X<0 THEN GOTO 960
930 LET SUM=SUM+P(Q,1)*X**P(Q,2)
950 GOTO 995
960 IF INT(P(Q,2)/2)<>(P(Q,2)/2) THEN
GOTO 990
970 LET SUM=SUM+P(Q,1)*ABS X**P(Q,2)
980 GOTO 995
990 LET SUM=SUM+P(Q,1)*-(ABS
X**P(Q,2))
995 NEXT Q
996 RETURN
```

The last one may require some more explaining. If you try the sequence of direct commands LET X=-5; PRINT X**2 you will soon discover the inability of the ZX-81 to calculate negative numbers to the powers of things. In the above subroutine line 930 handles positive values of X, line 970 handles negative values of X and even exponents, and line 990 handles negative values of X and odd or fractional exponents.

The next routine plots the graph of an equation in the array P. To make things easier, I shall explain each portion as we proceed.

```
1000 LET X=31 Calculate the best scale ratio
when x=31
1001 GOSUB 900
1002 LET R1=21/SUM
1003 LET X=-31 Calculate the best scale ratio
when x=-31
1004 GOSUB 900
1005 LET R2=21/SUM
1006 LET R=(ABS R1+ABS R2)/2 Find the
average of the two.
1007 PRINT "THE SCALE RATIO 1(X/Y) IS
";R
1010 INPUT A$
1012 CLS
1015 RAND USR 16514 Draw the axes.
1016 FOR X=-31 TO 31 This is the main
loop
1018 IF X=0 THEN NEXT X
1019 GOSUB 900
1155 LET S=SUM*R Find Y coordinate
1160 GOSUB 700 Plot it.
1170 NEXT X Loop back.
1180 GOTO 4 Restart.
```

You can then test the program. If, for example, you wanted a graph of the equation $y=x^2+x-4$ you would do the following:

1) Type RUN 10
2) Enter 3 for the number of terms

'It is very difficult to handle floating point arithmetic in machine code and it would be a very limited program if it were only to use the Z-80 integer arithmetic facilities'

3) Enter the numbers: 1;2; 1;1; -4;0 for the coefficients and powers of x — note that nought is used for the power of -4, because it can be written as $-4x^0$.
4) Enter one to select the graph plotting routine.
5) Press newline when the computer tells you the scale ratio.

That sounds like a complicated process but it is not once you are used to it.

The next part of the program solves

Figure 1.

```
2000 PRINT "DO YOU HAVE AN
APPROXIMATE ROOT"                  Find out if the user has an approximation —
2002 INPUT E$                      otherwise use 1 as a guess.
2003 LET E$=E$(1)
2004 CLS
2005 IF E$<>"Y" THEN GOTO 2010
2006 PRINT "THEN INPUT IT"
2007 INPUT X
2015 LET X=1
2020 CLS
2025 GOSUB 600                     Take the derivative.
2100 PRINT "THE EQUATION IS BEING
SOLVED; THANK YOU FOR BEING SO
PATIENT"
2110 PRINT AT 15,0
2120 GOSUB 900                     Find the value of the polynomial.
2130 LET SUM1=0
2140 FOR Q=1 TO A                  Find the value of the derivative of the
                                   polynomial.
2150 IF X<0 THEN GOTO 2180
2160 LET SUM1=SUM1+0(Q,1)*X**0(Q,2)
2165 GOTO 2210
2180 IF INT(0(Q,2)/2)<>0(Q,2)/2 THEN
GOTO 2200
2190 LET SUM1=SUM1+0(Q,1)* ABS
X**0(Q,2)
2195 GOTO 2210
2200 LET SUM1=SUM1+0(Q,1)*-(ABS
X**0(Q,2))
2210 NEXT Q
2220 LET T=X                       T is used to test if X is correct to 8 sig. figs.
2225 IF SUM1=0 THEN POKE 16384,32  Calculate the new value . . .
2230 LET X=X-SUM/SUM1
2240 LET X=VAL STR$ X
2250 IF X=T THEN GOTO 2300         This is the test.
2260 GOTO 2120                     Loop back.
2300 PRINT "X=";X                  Output correct value . . .
2310 GOTO 4                        Restart
```

polynomial equations, provided they contain only one unknown and that one side is equal to nought. One way of doing it would be to equip the computer with many formulae for each type of equation. One example would be the well-known formula for quadratic equations:

$$\frac{-b \pm \sqrt{b^2-4ac}}{2a} = x$$

where a, b, and c are the coefficients of x^2, x^1, and x^0 respectively.

That method would be memory-consuming and rather complicated — try working-out a formula for an equation with the highest term in x^{10} and you will appreciate the point. Instead we shall use the Newton-Raphson method, based on the equation:

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$$ where f denotes the polynomial as a function, f' denotes the derivative of the function, and the higher the subscript n the more accurate the root, since the method is based on improving an approximate root until a desired degree of accuracy is obtained.

We will be calculating the root to eight significant figures. The only disadvantage of the method is that it takes a very long time. The routine to perform this time-consuming task is shown in figure one.

You can test the routine now. If you wanted to solve the equation $x^2-10x+25=9$, you would first make the right-hand side equal to nought by subtracting nine from both sides to give $x^2-10x+16=0$; then you would enter the numbers in the normal way and use 2 to select the equation-solving routine; then, assuming you did not have an approximation, you would answer "NO" to the computer question and it would give 2 as a root for x. If instead you entered 10 as an approximation, you would obtain the alternative value 8.

> 'We are calculating the root to eight significant figures which takes time'

The routines in figures two and three take derivatives and integrals. If you have not yet learned calculus, do not worry; you will still be able to use the program without these routines.

In mathematics if we wanted to express the sum of the cubes of the first 20 numbers we would write:

$$\sum_{r=1}^{20} r^3$$

which means "the sum of the values of the expression after the sigma, when r is taken to have the integral values between 1 and 20 inclusive".

The routine in figure three should make things clearer:

Finally, I shall leave you with the following problems:

a) Solve the equation $1^2+x=3+\frac{1}{x}-\frac{1}{729}$ — you should find at least two roots.

b) A body is moving in a straight line and t seconds after passing a point A in the line its velocity is $(3t^2+4)$ m/s. Find the distance moved by the body while its velocity increases from 31 to 112 m/s. Also calculate the acceleration of the body when it has moved 5m from A.

c) It is known that an enemy ship will be at a point P at precisely 15.08 and 45 seconds. Your submarine is exactly 21.97km. from that point. The acceleration of your torpedo has a rate of change of $\frac{6}{1000}$. At what time exactly should you fire your first torpedo so that it arrives at P at the same time as the enemy ship?

d) Calculate the sum of the first 100 multiples of 4 squared.

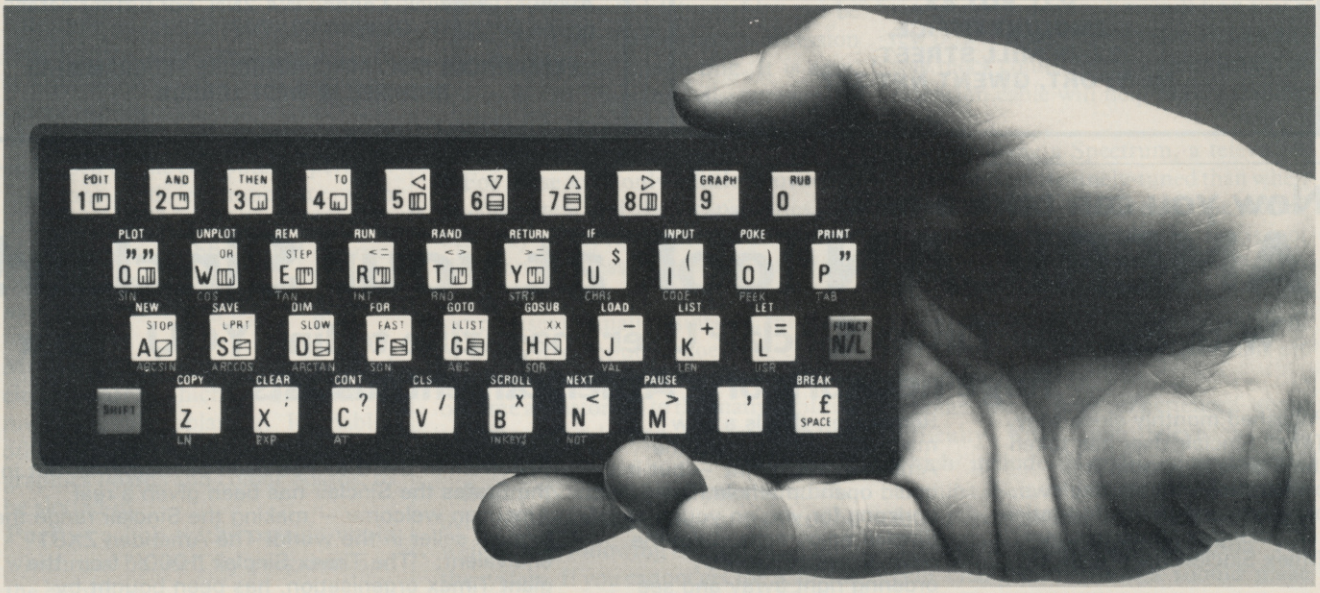
Figure 2.

```
3000 GOSUB 600                          Take the derivative
3010 FOR Q=1 TO A                       Transfer the equation in the
3020 LET P(Q,1)=O(Q,1)                  array O into the array P.
3030 LET P(Q,2)=O(Q,2)
3040 NEXT Q
3050 PRINT "DY"                         Output the derivative
3060 PRINT AT 2,0;"DX"
3070 PRINT AT 1,0;"__=";
3080 GOSUB 510
3090 GOTO 4                             Restart.
4000 GOSUB 800                          Take the indefinite integral
4010 FOR Q=1 TO A                       Transfer from I to P
4020 LET P(Q,1)=I(Q,1)
4030 LET P(Q,2)=I(Q,2)
4040 NEXT Q
4050 PRINT "DEFINITE OR INDEFINITE"
4060 INPUT B$
4070 LET B$=B$(1)
4080 CLS
4090 IF B$="D" THEN GOTO 4200           Does the user want it definite?
4100 RAND USR 16594                     Print an integration sign
4110 PRINT AT 3,4;"F(X) DX= "
4120 GOSUB 501                          Output the indefinite integral
4125 PRINT AT 6,0
4130 GOTO 4                             Restart
4200 RAND USR 16594                     This is for definite integrals . . .
4210 PRINT AT 5,0;"?"                   Input the two bounds
4220 INPUT B1
4230 PRINT AT 5,0;B1
4240 PRINT AT 0,1;"?"
4250 INPUT B2
4260 PRINT AT 0,1;B2
4270 LET X=B2                           Calculate the definite integral in
4280 GOSUB 900                          the usual way.
4290 LET B2=SUM
4300 LET X=B1
4310 GOSUB 900
4320 LET I=B2-SUM
4330 PRINT AT 3,4;"F(X) DX=";I          Output value and restart.
4340 GOTO 4
```

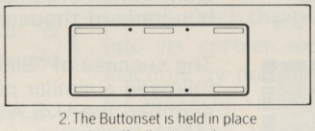
Figure 3.

```
5000 RAND USR 16565                     Print a sigma.
5005 LET R=0                            R 'accumulates' the value.
5010 PRINT AT 5,0;"X=?"                 Input the two bounds.
5020 INPUT C
5030 PRINT AT 5,2;C, AT 0,1;"?"
5040 INPUT C1
5050 PRINT AT 0,1;C1
5055 FOR X=C TO C1                      This is the main loop.
5060 GOSUB 900                          Find the value of the expression
5070 LET R=R+SUM                        Add this on to R
5080 NEXT X                             Loop back, incrementing x.
5100 PRINT AT 2,5;"F(X)=";R             Output
5120 GOTO 4                             Restart
```

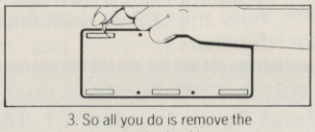
NOW. A ZX81 PUSH-BUTTON KEYBOARD FOR UNDER £10.



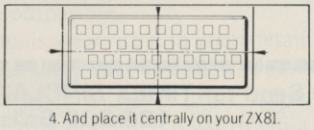
1. Make sure the original keyboard is clean and check that all the keys function.



2. The Buttonset is held in place by self-adhesive pads.



3. So all you do is remove the protective backing.



4. And place it centrally on your ZX81.

At last there's a really cheap but efficient way of ironing out the ZX81's only real bug: its keyboard. The Filesixty Buttonset offers:

■ A full-travel calculator-type moving keyboard for only £9.95. ■ Installed in seconds. The peel-off adhesive backing means you just register into position and press. ■ No messy labels, dismantling or soldering. ■ 3 groups of colour keys to pick out shift, numerals and newline. ■ Precision moulded in ABS to match your ZX81, with contrasting legends for maximum legibility.

Filesixty Ltd., 25 Chippenham Mews, London W9 2AN, England.
Tel: 01-289 3059. Telex: 268 048 EXTLDN G 4087.

Orders to Filesixty Ltd., FREEPOST, London W9 2BR.

Cheques/PO made payable to Filesixty Ltd.

Please send me _____ (qty.) Buttonset(s) at £9.95 each (including VAT and P&P).

Total £ _____ BLOCK CAPITALS

Name _____

Address _____

_____ SU10

_____ FILESIXTY

FRENCH
AND NOW
GERMAN
VOCABULARY TEST

Improve your vocabulary & spelling.

The program is fun and easy to use and tests for both gender and accents.

Side a: Nouns

Side b: Verbs, Adverbs, Adjectives etc.

150 foreign words on each side.

A sophisticated program that makes extensive use of Spectrums sound and graphics facilities.

French Vocabulary Test available in 16K and 48K versions (please state which).

German Vocabulary Test—48K version only.

All programs £4.95.

Cheques or P.O.'s to:

TUTORIAL SOFTWARE,
P.O. BOX 43,
ENQUIRY OFFICE,
22-29 MILL STREET,
NEWPORT, GWENT NPT 3XZ

CHILDREN'S EDUCATIONAL SOFTWARE

The MICRO MASTER Series for 7-13 years (any SPECTRUM)

RESEARCHED, DESIGNED AND TESTED by teachers with just one aim TEACHING. Easy to use — just RUN.

THE FOUR RULES OF NUMBER
(A package of 5 programmes)
This package promotes FAST and ACCURATE calculation ability at increasingly difficult levels. It is very EFFECTIVE as can be seen by consulting the enclosed grading tables for assessments of pupil's performance (given his age).

LANGUAGE DEVELOPMENT SERIES
(10 programmes on each cassette)
To develop VOCABULARY, SPELLING, CONCEPT ATTAINMENT, VERBAL REASONING and KNOWLEDGE OF THE ENGLISH LANGUAGE.

A complete series tailored to each age group. Used for remediation and, at the highest levels, for COMMON ENTRANCE etc.

THE FOUR RULES PACKAGE	£11.70
LANGUAGE DEVELOPMENT CASSETTE	£7.90
(State pupil's age.)	1 of each £14.50

Cheques to MICRO MASTER, Dept. SU, 94 Airedale Avenue, Chiswick, London W4 2NN. For further details phone Dr. K. W. Glasson 01-747 1373.

EXPERIENCED SINCLAIR/COMMODORE PROGRAMMERS REQUIRED IN WEST LONDON

Now you can take a new
AMERICAN look at your Sinclair!
With the new Timex Sinclair User magazine to link YOU into a huge network of American enthusiasts

Published monthly since May, Timex Sinclair User has taken the States by storm. It is packed full of news, reviews, programs and user information . . . linking you into the vast Timex Sinclair User network.

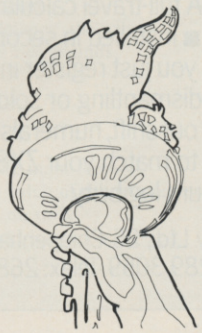
Remember, this is a new magazine written from the American viewpoint — but it could open up whole new horizons for you on your Sinclair enjoyment. Take the new American view by ordering right away and see how the U.S.A. welcomed the Sinclair!

The success of the Sinclair ZX80, ZX81 and Spectrum in the U.K. has been phenomenal. But in the States the Sinclair has been given a real American welcome — making the Sinclair range the biggest seller in the world! The American ZX81 equivalent: "The Timex Sinclair 1000" from the giant Timex organisation, has been bought by hundreds of thousands of enthusiasts.

The success of 'Sinclair User' magazine in the U.K. followed a similar pattern — so now we have matched the U.S.A. enthusiasm with a brand new U.S.A. magazine — *the Timex Sinclair User!*

Annual subscription rate is £20. Single copes are £2 (including P & P).

Fill in the order form NOW to discover the American way of computing!



Send to: TIMEX SINCLAIR USER, ECC Publications Ltd., 196-200 Balls Pond Road, London N1 4AQ

Yes, I want to subscribe to TIMEX SINCLAIR USER at the special U.K. rate of £20 for 12 issues delivered to my door.

Name _____

Address _____

_____

_____

I enclose a cheque/P.O. for £_____

Please charge my credit card

Card Name_____ **Card Number**_____

Signature_____ **Date**_____

N.B. This offer applies to UK subscribers only. Overseas rates available on request.

N.B. Subscribers to Sinclair Programs or Sinclair Projects should be aware that Timex Sinclair User will occasionally reproduce top articles that have appeared in our U.K. magazines.

GLOSSARY

Basic — Beginners' All-purpose Symbolic Instruction Code. A programming language resembling English which is used by beginners because most popular microcomputers have it as standard.

Bug — an error in a program.

EPROM — Erasable Programmable Read-Only Memory. Semi-permanent storage. Information is not erased if the power is turned off in the computer. Programs can be erased by subjecting the memory chips to ultra-violet light. The memory can then be re-programmed using an electrical device called an EPROM blower.

Interface — RS232 and Centronics. A device which enables other computers or add-ons, such as printers, to be connected to the computer. It converts non-standard signals from add-ons to the standard signals of the computer in use.

Kilobyte — (K). A measurement of memory size. Most machines use 16K as a minimum but 48K is generally agreed to be necessary for serious work.

Machine code — an electronic pulse code used by the computer to perform functions and communicate with memory and other devices.

Mnemonics — abbreviated instructions — for example LD for Load — used in machine language programming.

Motherboard — an external printed circuit board which is used like a multi-way plug planner. It enables other printed circuit boards, such as graphics boards and colour boards, to be slotted-in.

Port — a link to the outside world which can be used by programs and the computer.

PCB — printed circuit board. A board which has on it the electronic circuits of the computer.

RAM — Random Access Memory. Information and programs can be stored in this type of memory as electronic pulses which conform to a set of numbers — machine language — in which programs are represented in the computer. When the power is turned off the information will be lost.

ROM — Read Only Memory. Information stored in this type of memory is not lost when the power is switched off.

Software — programs which control the operation of the computer.

Syntax error — a bug caused by incorrect use of a programming language.

Our easy-to-follow guide for new owners

The basic route to a habit-forming hobby

BUYING a Sinclair machine can be the start of a life-time's obsession with home computing. It is easy, however, to become discouraged if everything does not go according to plan from the beginning.

For those with only a little knowledge of computers and their capabilities, the best way to approach the machines is to abandon any ideas for special uses. While the 48K Spectrum is big enough for simple uses in small businesses, the range of Sinclair computers does not contain machines for major uses. It is better to become accustomed to the many facilities and then decide how you wish to use them.

Begin by unpacking your machine, overcoming your surprise at its size and weight and, following the manual, set up the system. If you cannot get the K on the screen, check that everything is plugged into its correct socket and re-set the machine by pulling-out the power plug for one second and try tuning-in again. If still nothing appears, check the power supply unit by shaking it. If it rattles, return it. If it is satisfactory, check your system with that of a friend.

If you have a Spectrum you will have received an introductory booklet which explains what the computer can do and giving detailed instructions on how to set it up. Also included is a fault-finding guide.

Once the K appears you are ready to begin learning about your machine. It can prevent family arguments if you can afford a separate television set for your system. It also makes life easier if you find somewhere to leave your equipment set up permanently. You will find that a few power sockets are needed and a four-way block connector on a short length of extension cable will help to tidy trailing leads.

When using a Spectrum, a television set has to be more finely-tuned than when using a ZX-81 because of the added dimension of colour. If the set is not tuned properly, the colours will look hazy instead of sharp and clear. If no colour can be seen when it is switched on, the power supply or the television set may be at fault.

Some users have experienced some difficulty with some television sets, which include Hitachi, Grundig and Toshiba. Sets which many people have found compatible include the Sony Trinitron, Fidelity and Ferguson. Recent changes in the ULA should make more sets compatible.

The manuals are written in great detail and are reasonably easy to follow. Some of the chapters may not seem immediately relevant but it is worthwhile reading them as you might miss something important.

Patience is needed at that stage to learn the ways in which the computer will accept information. It is tempting to try to enter programs before you are ready but that is likely to lead to errors. For example, words like AND, THEN and AT should not be typed-in letter by letter.

By the time you have reached chapter 11 in the ZX-81 manual and chapter 19 in the Spectrum manual you should have accumulated sufficient knowledge to be

continued on page 112

continued from page 111

able to type-in other people's programs, such as those in *Sinclair User* and *Sinclair Programs*, without too much difficulty.

It is important when using the ZX-81 that it is not jolted. Some of the connections can easily work loose and everything which has been entered will be lost.

The manuals are not to everyone's liking and if you find them difficult to follow a number of books on the market can help you. Find the one which suits you best.

As a way of relaxing you can buy some of the growing range of commercially-produced software. That can be loaded directly from cassette but make sure that your machine is big enough to take the tapes you buy.

For the ZX-81 there are a few tapes for the unexpanded 1K machine but the majority require the 16K RAM pack. Similarly on the Spectrum most companies are taking advantage of the possibilities provided by the larger 48K machine rather than providing cassettes for the 16K.

The tapes can vary in quality and it is advisable to read the reviews in *Sinclair User* and use your judgment to find the best.

An alternative method to learn about both the ZX-81 and the Spectrum is to plunge in at the deep end and see what the machines will do. Refer to the manuals when you have difficulties. You can ignore the functions and calculations initially and experiment with PRINT statements to obtain the feel of the machines.

You may already have heard about the problem involved in SAVEing and

LOADing your own cassettes. The manual gives detailed instructions but many of the early ZX-81s would not accept tapes from some recorders. That problem is said to have been overcome but there can still be difficulties.

Usually they occur when LOADing tapes recorded by other people. One simple method to overcome this is to wind the tape to the middle of the program and type LOAD "" followed by NEWLINE; then increase the volume of the recorder slowly with the tape running until the television screen shows four or five thick black bands. If you then rewind the tape, the program should LOAD normally.

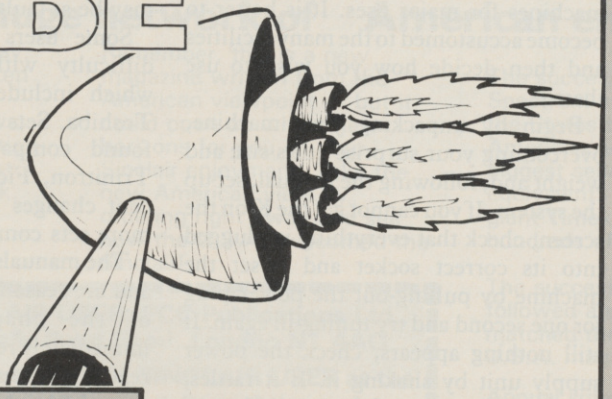
LOADing and SAVEing on the Spectrum is much easier and faster than the ZX-81. One difference is that when SAVEing on the Spectrum the LOAD lead must be disconnected either at the recorder or the Spectrum.

Finally, a health warning. Apart from any practical uses, computing with your Sinclair machine can be a very entertaining hobby and is almost certainly habit-forming. You may easily find yourself crouched over your machine, red-eyed, in the early hours of the morning thinking that in another five minutes you will solve the problem. Try to break that habit by getting into the fresh air and meeting other Sinclair users.

By obtaining a Sinclair computer you find that you have joined a not very exclusive club with many thousands of members, many of whom would be only too happy to advise you if you have difficulties.

Make sure of your regular copies of *Sinclair User* and *Sinclair Programs* and you can be guaranteed many happy hours.

TUBE

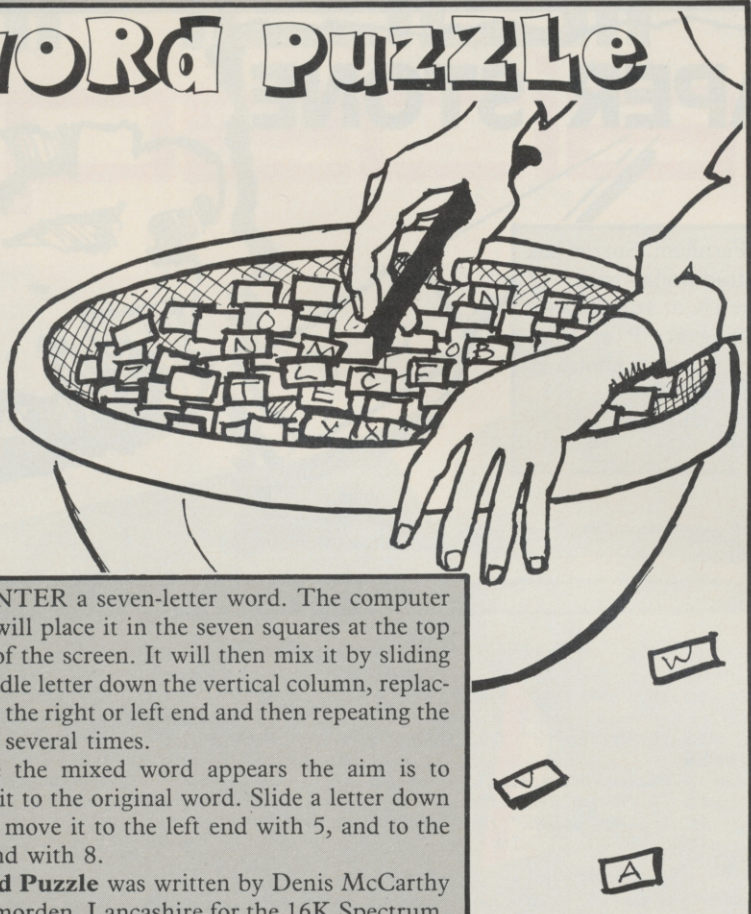


YOUR SUPPLY SHIP will appear, darting about, at the top of the screen. Pressing any key will stop it. A **Tube** will then start to descend from it. Your aim is to link the tube with the still-moving mothership, to transfer vital supplies. Slow the movement of the tube with 0 until you are ready to make the link.

Written for the 16K ZX-81 by Nicholas Watkins of Penn, Wolverhampton.

```
   10 FOR F=0 TO 20
  20 PRINT AT F,0;"(9Ø)";AT F,31
;"(95)"
  30 NEXT F
  40 PRINT AT 0,1;"(3Ø*99)";AT 2
0,1;"(3Ø*9f)"
  50 FOR F=1 TO 19
  60 PRINT AT F,1;"(3Ø*9h)"
  70 NEXT F
  75 SLOW
  80 LET X=4
  85 PRINT AT 21,0;"      PRESS A
NY KEY PLEASE"
  90 LET Y=INT (RND*22)+4
  92 PRINT AT 3,Y-1;"(1:1h:1:)"
;AT 3,Y-1;"(3*9h)"
  95 IF INKEY$="" THEN GOTO 90
  96 PRINT AT 3,Y-1;"(1:1h:1:)"
  97 PRINT AT 21,0;"
                "
 105 PRINT AT 18,F;"(4*9h)"
 110 FOR F=2 TO 16
 115 PRINT AT 18,F;"(1h:1sP:1f:1
sP:)"
 120 PRINT AT X,Y;"(1sP:)";AT X,Y
;"(1s:)"
 130 LET X=X+.30
 135 IF INKEY$="0" THEN LET X=X-
.25
 140 IF X<18 THEN NEXT F
 150 IF X<18 THEN GOTO 96
 160 IF Y=F+2 THEN GOTO 200
 163 FAST
 164 SLOW
 165 FOR R=0 TO 3
 170 PRINT AT X-1,Y;"*";AT X,Y-1
;"*(1*:)*";AT X+1,Y;"*";AT X-1,Y;
"(1*:)";AT X,Y-1;"(1*:)*(1*:)";AT X
+1,Y;"(1*:)"
 175 NEXT R
 180 PRINT AT 21,0;"            **
MISSED**      "
 190 IF INKEY$="" THEN GOTO 190
 195 GOTO 50
 200 PRINT AT 17,F;"(9h:9f:1sP:9
f:)"
 210 PRINT AT 21,4;"    ****WELL
DONE****    "
 220 GOTO 190
 500 SAVE "T.d"
 510 RUN
```

WORd PUZZLe



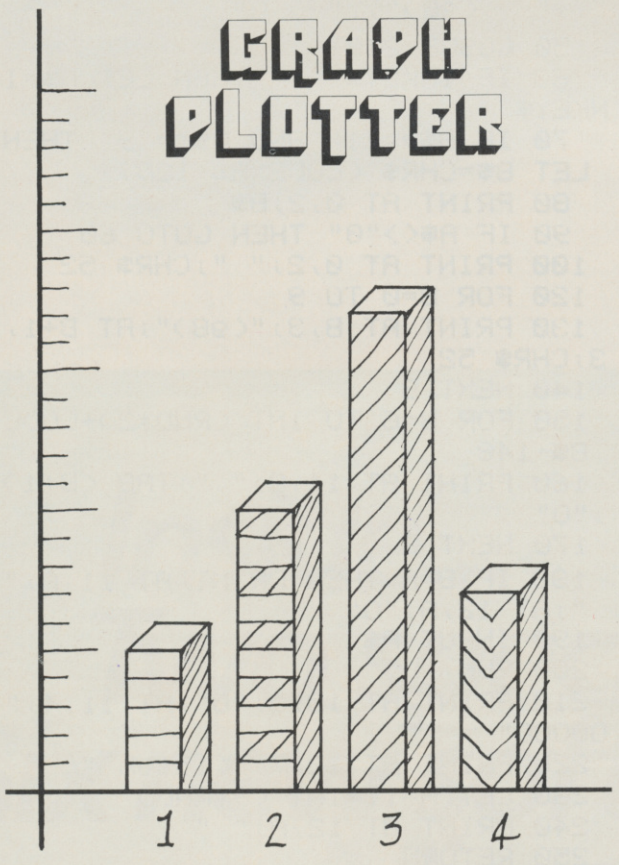
ENTER a seven-letter word. The computer will place it in the seven squares at the top of the screen. It will then mix it by sliding the middle letter down the vertical column, replacing it at the right or left end and then repeating the process several times.

Once the mixed word appears the aim is to restore it to the original word. Slide a letter down with 6, move it to the left end with 5, and to the right end with 8.

Word Puzzle was written by Denis McCarthy of Todmorden, Lancashire for the 16K Spectrum.

```
  10 BORDER 1: PAPER 6: INK 0
  20 CLS : PRINT AT 0,1;"Enter d
ifficulty level (1-5)? "
  30 INPUT D: IF d<1 OR d>5 OR d
<>INT d THEN GO TO 30
  40 PRINT D;AT 12,5;"PRESS A KE
Y TO PLAY": PAUSE 4E4
  50 CLS : FOR f=1 TO 7
  60 PLOT 16+f*24,135
  70 DRAW 23,0: DRAW 0,-23: DRAW
-23,0: DRAW 0,23: POKE 23658,8
  80 IF f=7 THEN FOR f=1 TO 4: P
LOT 112,f*24+15
  90 DRAW 23,0: DRAW 0,-23: DRAW
-23,0: DRAW 0,23: NEXT F
 100 INPUT A$: LET C$=A$
 110 FOR k=1 TO 7
 120 IF CODE a$(k)<65 OR CODE a$
(k)>90 THEN GO TO 100
 130 NEXT K: GO SUB 270: LET M=0
 140 LET B$="": FOR C=1 TO D*5,
 150 LET B$=A$(1 TO 3)+A$(5 TO 7
): LET A$=A$(4)+B$
 160 IF INT (RND*2) THEN LET A$=
B$+A$(1)
 170 NEXT C: GO SUB 270
 180 IF INKEY$<>"6" THEN GO TO 1
80
 190 PRINT AT 6,15;" ";AT 18,15;
A$(4)
 200 LET L=(INKEY$="8")-(INKEY$=
"5"): IF L=0 THEN GO TO 200
 210 PRINT AT 6,18;A$(4)
 220 LET B$=A$(1 TO 3)+A$(5 TO 7
): LET A$=A$(4)+B$
 230 IF L=1 THEN LET A$=B$+A$(L)
 240 GO SUB 270: PRINT AT 18,15;
" ": LET M=M+1
 250 IF A$<>C$ THEN GO TO 180
 260 PRINT AT 2,3;"YOU SOLVED IT
 IN ";M;" MOVES";TAB 5;"ON DIFFI
CULTY LEVEL ";D: STOP
 270 FOR k=1 TO 7: PRINT AT 6,3+
K*3;A$(K): NEXT K: RETURN
```

GRAPH PLOTTER



NICHOLAS BRADLEY of Havant, Hampshire has written a simple **Graph Plotter** program for drawing block graphs on the 1K ZX-81. Numbers less than 43 will be plotted clearly and could then be copied by a printer.

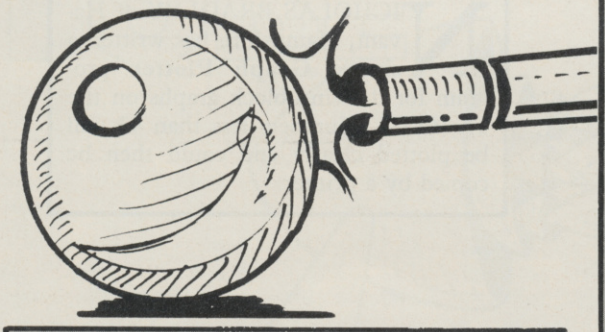
```
   1 REM GRAPH DRAWER
   8 LET X=5
  10 PRINT "ENTER THE NUMBERS(UN
DER 43)";AT 21,0;"0";AT 16,0;"10
";AT 11,0;"20";AT 6,0;"30";AT 1,
0;"40"
  20 INPUT A
  25 IF A>43 THEN LET A=43
  30 FOR H=1 TO A
  40 PLOT X,H
  50 NEXT H
  60 LET X=X+1
  70 GOTO 20
```

KNIFE PAPER STONE

RUSSELL WOOBERRY of Farnham, Surrey has written a version of the traditional game of **Knife, Paper, Stone** for the 1K or 16K ZX-81. Choose one of the three by pressing K, P or S as appropriate. The computer will then make its choice at random and tell you whether you have lost or won. Knife cuts paper, paper wraps stone, and stone blunts knife. Press enter for another round.

```
 1 CLS
 2 RAND
 3 LET A$=""
 4 PRINT "CHOOSE?(PAPER,KNIFE
OR STONE)"
 5 IF INKEY$="S" THEN LET A$="
STONE"
 6 IF INKEY$="K" THEN LET A$="
KNIFE"
 7 IF INKEY$="P" THEN LET A$="
PAPER"
 8 IF A$="" THEN GOTO VAL "5"
 9 PRINT "YOUR CHOICE IS ";A$
10 LET C=VAL "INT (RND*3+1)"
11 IF C=VAL "1" THEN LET B$="S
TONE"
12 IF C=VAL "2" THEN LET B$="K
NIFE"
13 IF C=VAL "3" THEN LET B$="P
APER"
14 PRINT "MY CHOICE IS ";B$
15 IF A$=B$ THEN PRINT "DRAW"
16 IF A$="STONE" AND B$="PAPER
" THEN PRINT "I WIN PAPER WRAPS
STONE"
17 IF B$="STONE" AND A$="PAPER
" THEN PRINT "YOU WIN PAPER WRAP
S STONE"
18 IF A$="KNIFE" AND B$="PAPER
" THEN PRINT "YOU WIN KNIFE CUTS
 PAPER"
19 IF B$="KNIFE" AND A$="PAPER
" THEN PRINT "I WIN KNIFE CUTS P
APER"
20 IF A$="STONE" AND B$="KNIFE
" THEN PRINT "YOU WIN STONE BLUN
TS KNIFE"
21 IF B$="STONE" AND A$="KNIFE
" THEN PRINT "I WIN STONE BLUNTS
 KNIFE"
22 INPUT Z$
23 RUN
```

SNOOKER



AT THE TOP of the screen appears an inverse 0 at the end of the cue. At the bottom of the screen appears the snooker table with a pocket in a random position. Choose a speed between 1 (slow) and 9 (fast). Then press 0 and the cue will send the ball towards or into the pocket. Press NEWLINE for another shot.

Snooker was written for the 1K or 16K ZX-81 by Peter Rawbone of West Norwood, London.

```
 10 LET B$="(10)"
20 CLS
30 LET A$=""
40 PRINT ,,"    (98)",,"    (98)
",,"    (98)",,"    0"
 50 GOSUB 210
 60 IF INKEY$<>"" THEN LET A$=I
NKEY$
 70 IF A$>="1" AND A$<="9" THEN
 LET B$=CHR$ (CODE A$+128)
 80 PRINT AT 0,2;B$
 90 IF A$<>"0" THEN GOTO 60
100 PRINT AT 0,2;" ";CHR$ 52
120 FOR B=0 TO 9
130 PRINT AT B,3;"(98)";AT B+1,
3;CHR$ 52
140 NEXT B
150 FOR B=6 TO INT (RND*2)+CODE
 B$-148
160 PRINT AT 11,B;" ";TAB (B+1)
;"0"
170 NEXT B
180 IF B=A THEN PRINT AT 11,A;"
";AT 12,A;"0"
190 INPUT A$
200 RUN
210 PRINT AT 10,3;"0";AT 11,4;"
00000"
220 PRINT AT 12,7;"(15*9M)"
230 LET A=11+INT (9*RND)
240 PRINT AT 12,A;" "
250 RETURN
```

sinclair special 4

Inside...
Two special offers...
Six new software titles...
Microdrive!

Something for everyone, from Sinclair!

Welcome to another Sinclair Special. Even if you're not yet a Sinclair owner; I believe you'll find something of interest in this latest issue.

For instance, if you're looking for the best way to begin computing, turn to our back page. You'll see that leading Sinclair retailers are now offering the popular ZX81, complete with a 16K RAM Pack *and* a free software cassette, all for £45. That means savings of at least £29 on one of the world's all-time best-selling computers.

Those same retailers are also offering the ZX Printer at its regular price of £39.95, but accompanied by a *free* 5-roll Paper Pack, worth £11.95.

If you want to add even more speed and versatility to your ZX Spectrum system, you'll be pleased to hear that the new ZX Microdrive has now been officially announced.

Microdrives are being released on an order of priority basis. Spectrum owners who purchased direct from us will be sent order forms, in a series of mailings that begin with the earliest names on our list of Spectrum owners. If you didn't buy direct from us by mail order, send us your name and address (use the coupon in this Sinclair Special). We'll add your name to the list, and send you a colour brochure and details on how to order.

Finally, if you're looking for more ways to use your ZX system, take a look at the software opposite. There are programs for programmers, a space-chase and car race for arcade-game players, a brand new logic game for those who've exhausted 'the cube.'

The Cattell IQ Test is based on the definitive professional psychologists' test – and forms an accurate but easy way of measuring your own IQ. All the new programs are available direct from us, through the order form in this issue.

You'll see what I mean about Sinclair having something for everyone. And we'll have even more to show you at two forthcoming exhibitions: the PCW Show at the Barbican Centre, from September 28th to October 2nd, and the Great Home Entertainment Spectacular at Olympia, from September 17th to 25th.

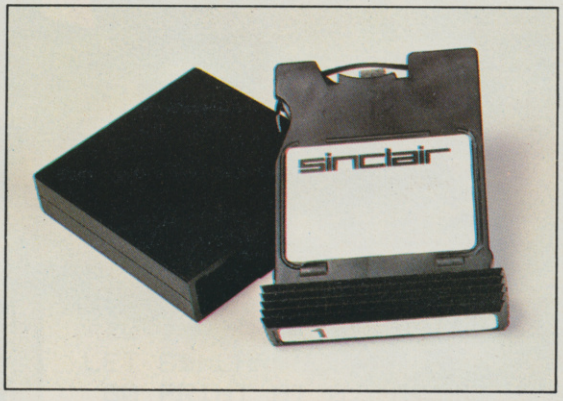
Nigel Searle

Nigel Searle, Managing Director
Sinclair Research Ltd.

ZX Microdrive System preview!

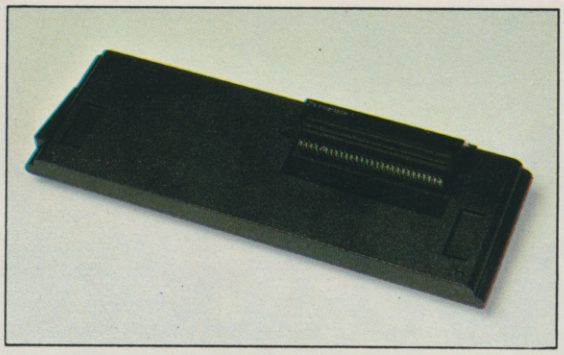
ZX MICRODRIVE

At least 85K bytes storage, loads a typical 48K program in as little as 9 seconds: £49.95.



ZX MICRODRIVE CARTRIDGE

Compact, erasable, revolutionary. Complete with its own storage sleeve. Contains up to 50 files, with a typical access time of 3.5 seconds: £4.95.

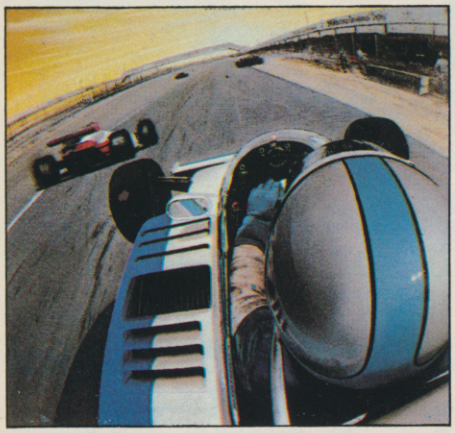


ZX INTERFACE 1

Necessary for sending and receiving information from ZX Microdrive. Includes RS232 interface and local area network facility for 2 to 64 Spectrums. Attaches to the underside of your Spectrum. Purchased with ZX Microdrive, just £29.95. As separate item, £49.95.

PSYCHOLOGY, GRAND PRIX RACING, BRAIN TEASING, PROGRAMMING, SPACE-BLASTING!

Sinclair have it all taped with six brand-new programs for ZX Computers!



Chequered Flag
For 48K RAM Spectrum. **£6.95**

Have you ever wanted to drive a Formula One car flat-out round a Grand Prix circuit? With Chequered Flag you'll need one eye on the road and one eye on the instruments, as you steer and brake to avoid hazards, and work through the gears in search of the lap or race record. This outstanding new program puts you in the driver's seat with stunning realism, and gives you a choice of three cars and ten different circuits. Don't crash!

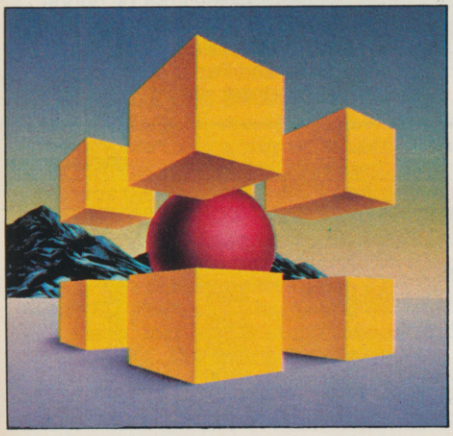
Mothership
For ZX81 with 16K RAM. **£4.95**

Scream down the claustrophobic confines of the Zarway. Engage suicidal drone fighters in deadly laser combat. Dodge, duck and dive in a high-speed 3-D race to attack the evil Mothership before she claims your home planet. Mothership is a truly tough challenge, and fast, furious fun!

Cattell IQ Test
For 48K RAM Spectrum. **£12.95**

Although there are a number of so-called self-administered IQ tests on the market, the only reliable way of finding your IQ has – until now – been to visit a qualified psychologist and take a battery of tests – for a fee. Now Victor Serebriakoff, International President of Mensa, has produced Professor Cattell's test in a form which enables you to use your ZX Spectrum to test your IQ.

The Cattell Scale IIIA test is timed by the computer, marked immediately, and the marks standardised against your age. This is the first time that an accredited, standardised test has been available to the general public.



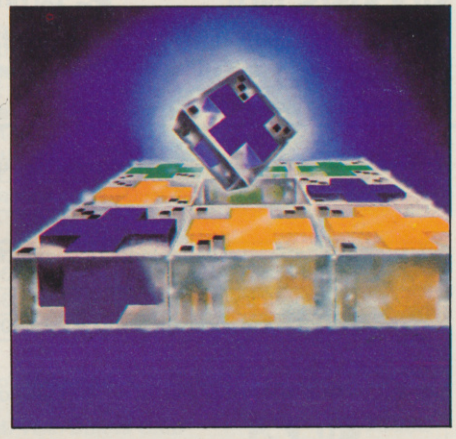
Zeus Assembler
For 48K RAM Spectrum. **£12.95**

A powerful and easy-to-use programming aid, designed to simplify the entire process of producing machine code programs, enabling you to write in assembly language instructions. Comes complete with comprehensive range of support facilities.

Monitor and Disassembler
For 16K & 48K RAM Spectrums. **£12.95**

This powerful Disassembler translates machine code into comprehensible assembly language instructions, allowing you to examine the BASIC ROM, to investigate the workings of the Spectrum or to analyse your own machine code routines.

With the highly versatile Monitor, you get an extensive set of facilities to aid the entry, inspection, modification and debugging of your own machine code programs.



Flippit
For 16K or 48K RAM Spectrums. **£9.95**

Like those cube games, Flippit looks simple. But its fiendish ingenuity results in the ultimate game of logic and patience. Twist, turn and swap the nine Flippit pieces in search of the elusive magic square. But be warned, those pieces can be arranged in *millions* of combinations...

TWO SPECIAL OFFERS FROM SINCLAIR

STARTER PACK: £45

Powerful passport to home computing – now at the lowest price ever!

ZX81

Sinclair ZX81 – 900,000 sold so far. Touch-sensitive keyboard… black and white graphics… just plugs into most TV sets. With 212-page BASIC manual – step-by-step guide to the world of personal computing. Normal price £39.95.

ZX 16K RAM PACK

Gives the ZX81 more power – the power to run sophisticated software like Flight Simulation and Chess. Normal price £29.95.

CASSETTE

Worth £4.95 or more. In every starter pack, there's a top-flight 16K cassette – like Chess or Fantasy Games or one of the valuable education series. Actual title varies with availability. And once you own your starter pack, there are 37 other Sinclair cassettes available (plus dozens from other manufacturers).

Look for the special packs at WH Smith, Boots, John Menzies, Currys and other leading Sinclair stockists. Not available by mail order.

Offers subject to availability while stocks last.

ZX PRINTER AND FREE 5-ROLL PAPER PACK: £39.95

ZX PRINTER

Designed exclusively for use with the Sinclair ZX81 and ZX Spectrum personal computers. Printing speed: 50 characters per second. 32 characters per line, 9 lines per vertical inch. Plus graphics direct from screen. Now with a *free* pack of 5 rolls of special paper (normal price £11.95).

sinclair

Sinclair Research Ltd, Stanhope Road, Camberley, Surrey, GU15 3PS. Telephone: (0276) 685311.

How to order

Simply fill in the relevant section(s) on the order-form below. Note that there is no postage or packing payable on Section B. Please allow 28 days for delivery. Orders may be sent FREEPOST (no stamp required). Credit-card holders may order by phone, calling 01-200 0200, 24 hours a day. 14-day money-back option. ZX81 Starter Pack and Printer and Paper offers are not available by mail order.

To: Sinclair Research Ltd, FREEPOST, Camberley, Surrey, GU15 3BR. **ORDER FORM**

Section A: hardware purchase

Qty	Item	Code	Item Price £	Total £
	ZX Spectrum – 48K	3000	129.95	
	ZX Spectrum – 16K	3002	99.95	
	Postage and packing:	0029	4.95	
			TOTAL £	

ZX81 Starter Pack and Printer and Paper offers are not available by mail order.

Section B: software purchase

Qty	Cassette	Code	Item Price £	Total £
	FOR SPECTRUM			
	L4/S Monitor & Disassembler	4403	12.95	
	L3/S Zeus Assembler	4402	12.95	
	G26/S Flippit	4025	9.95	
	P1/S Cattell IQ Test	4500	12.95	
	G31/S Chequered Flag	4030	6.95	
	FOR ZX81			
	G26 Mothership	2125	4.95	
			TOTAL £	

Signature

*Delete/complete as applicable.

*I enclose a cheque/postal order made payable to Sinclair Research Ltd for £

*Please charge to my Access/Barclaycard/Trustcard account no:

Mr/Mrs/Miss

Address

SUS 910

(Please print)

ZX Microdrive information request

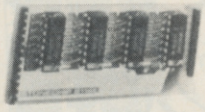
Please add my name to the Microdrive Mailing List, *and* send me a colour brochure with full specifications of ZX Microdrive/Interface 1 ☐ *(tick here)*. You can use the above form to send us your name and address.

SPECTRUM AND ZX81 HARDWARE

The famous Panda Expandable Ram Pack. Massive 16K add-on memory which can easily be expanded to 32K with an optional plug-in module. Supplied in rugged no-wobble design, rugged, injection moulded case, contoured to fit the ZX81 snuggly. Compatible with other add-ons (printer etc). LED on/off indicator. No additional power needed just plug in an go. British designed and made from top quality components throughout, guaranteed 12 months. **£19 · 95**

EXPANSION MODULE

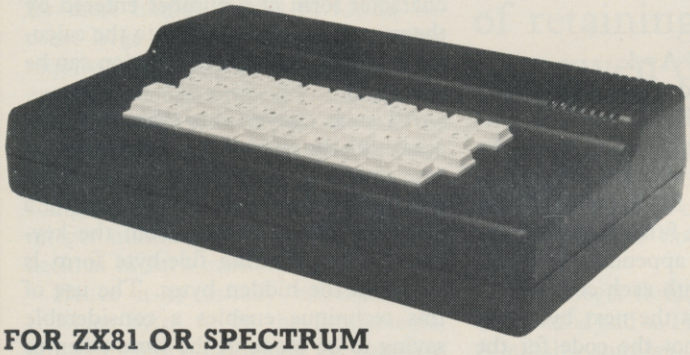
The 16K 'Panda' is easily expanded from 16K to 32K by adding this expansion module as and when you need it. **£14 · 50**



GIANT PANDA

Giant Panda the two together. Buy the Panda and the Expansion Module at the same time for a gigantic 32K bytes and save.
Complete at a special price of **£34 · 00**

PROFESSIONAL CASED KEYBOARD TYPE FD42



FOR ZX81 OR SPECTRUM

This famous, best selling product immediately converts your ZX Computer into a sturdy, attractive and professional unit, with full size typewriter keyboard. A tough plastic case encloses the keyboard, PCB and power supply. It has 42 keys including all the ZX81/Spectrum graphic characters printed on them. The full travel key switches have gold plated contacts and guaranteed life of 10^6 operations. It's so easy to install! You simply unscrew the ZX PCB from its case, screw it to the FD case, and plug in the keyboard. No soldering. Access to user port is unobstructed for memory upgrade etc. Full instructions supplied. **£29 · 95**

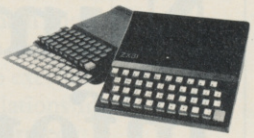
Fitting service **£4 · 00**

RAM Adaptor Board—enables you to fit 16K Expansion (all types) inside Fuller-case— **£9 · 75**

TYPE FDS FOR ZX81 OR SPECTRUM

Our new advanced keyboard has the same, fine specifications as the FD42 system, but with a new re-designed case, space bar and double-sized shift and enter keys. A must for the discerning ZX81 or Spectrum user. **£39 · 95**

ZX KLIK—KEYBOARD



If, like many ZX81 users, you are fed up with the dead feel of the touch sensitive keypad then consider the well tried 'Klik-Keyboard'. This is a simply fitted genuine push button keyboard which has been designed as an exact replacement for, and is no larger than, the existing keypad. ■ Fits on to the ZX81. ■ Full 40 keys plus one spare for any purpose. ■ No soldering—just plug in. ■ No trailing wires. ■ Clear permanent two colour legends. ■ Positive feel and sound as data is entered. ■ Speeds up programming enormously and reduces errors. ■ Fitting service offered £2.00 extra (remember to send your ZX81). **£24 · 50**

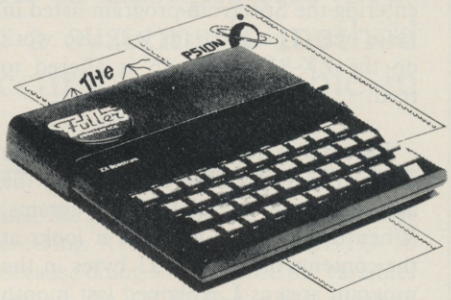
THE SOUND EXPANDER

A superb economical addition to your ZX Spectrum. Clear, dynamic sound effects will really enhance your enjoyment of the new exciting programs available for the Spectrum. Our new sound amplifier comes with lead, pre-setable volume and built-in loudspeaker. Simply plug into the mic input, it fits neatly behind the Spectrum. **£7 · 50**

16-48K Spectrum upgrade

REDUCED due to volume sales
16K Spectrum owners—upgrade to 48K with a Spectrum Upgrade Pack complete with full instructions.
No Soldering.
Issue II and III. **£25 · 00**

The FD Printerface



The amazing FULLER PRINTERFACE is designed to operate with any serial printer or teletype. For graphic displays the SEIKOSHA 250 is recommended, as all the software is held in ROM to carry out the graphic routines. The PRINTERFACE can also be made to print out graphics on the Tandy DMP 100.

Simple commands to print are used, to either print at Sinclair printer size displays or normal 80 column. Spectrum only. Full details supplied with each unit.
PRICE £39.95
RS 232C £34.95
Dual (Selectable) Version £49.95

Please supply (state which computer you have).

Quantity	Item	Amount

Round-the-clock telephone orders 0256 52208
I wish to pay by Access/Barclaycard/Visa/Diners Club
Please debit my creditcard a/c
NUMBER ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
Signed .....

All prices include VAT and post and packaging. All items include a full year guarantee. Products are stocked and usually despatched within 10 days. Overseas customers add £4 post and packing. Cheques/Postal Orders etc. should be made payable to AFDEC Electronics Ltd.

Name _____
Address _____

EXPORT ORDERS WELCOME PLEASE ADD £4.00 P&P.
Round-the-clock telephone orders 0256 52208

AFDEC ELECTRONICS LTD 318 Kempshott Lane Basingstoke Hants RG22 5LT

Numbers are followed by information not in listings

Andrew Hewson returns to the program area of memory in RAM to find six bytes which are hidden in the program-following figures

LAST MONTH I explained how line numbers are held in both the ZX-81 and the Spectrum and showed how they could be studied using a short routine which investigated the program area in RAM. This month I shall study again the program area but for a different purpose.

I am doing so in response to the following question from Alan Sheldon of Aylesbury, He asks: **It would appear that numbers in the program area of memory are followed by additional information which does not appear in listings. Is that so and if so why?**

Sheldon is correct as can be seen by entering the Spectrum program listed in table one. The program will also work on the ZX-81 if line 15 is altered to read:

15 LET S=16509

Line 5 is a dummy line, the purpose of which is to allow the user to study the appearance of numbers in programs. When the program is RUN it looks at the contents of the first 21 bytes in the program area as I explained last month and displays them on the screen. The results for the Spectrum and the ZX-81 are shown in tables two and three respectively.

The first two bytes contain the line number (5) and the next two bytes specify the length of the remainder of the line (11 bytes). The next four bytes hold the character codes for the first line of the program:

```
5     LET A=1
10    PRINT "BYTE"; TAB 6;
      "CONTENTS"; TAB 16;
      "CHARACTER"
15    LET S=PEEK 23635+256*PEEK
      23636
20    FOR I=S TO S+20
25    PRINT I;TAB 8;PEEK I;TAB
      20;CHR$ PEEK I
30    NEXT I
```

Table 1. A Spectrum program which looks at the first 21 bytes of the program area.

● *Please address problems and queries to Andrew Hewson, Helpline, Graham Close, Blewbury, Oxfordshire.*

LET A=1

The character codes vary slightly between the two machines. For example, the code for the letter 'A' is 65 on the Spectrum and 38 on the ZX-81 although the code for the 'LET' is 241 on both machines. The full list of character codes is given in appendix A of the manual supplied with each computer.

On the Spectrum the next byte contains 14. That is not the code for the end of a line, as might be expected, but instead it is described in appendix A of the manual as "number". In fact, the byte acts as a signal to the LIST and other commands to ignore the byte and the contents of the five locations which follow it. Hence there is no indication in listings of the program that those additional locations are used. The line is terminated by the next byte which contains 13 — the ENTER character.

On the ZX-81 the character codes are different but the effect is the same. The location containing the code for '1' is followed by six "hidden" bytes, which do not appear in program listings.

Some clue as to the purpose of those hidden bytes can be gained by replacing line 5, the dummy line, by another line. Try, for example, RUNning the program with

5 LET A=2.7

as the dummy line. The characters for the number "2.7" occupy three bytes, not one as for the number "1", but again the number is followed by six hidden bytes. A few minutes' experimentation will show that whenever a number appears within a program six hidden bytes follow.

The reason for the use of the hidden bytes is that the ZX-81 and the Spectrum do not store and manipulate numbers in the character form in which they are displayed. They are converted into a "calculation" format and all additions, multiplications and so on are undertaken on the numbers in this format. When the result of a calculation is PRINTed it must be converted into characters for display on the screen. Similarly, the character form of a number entered by the user must be converted to the calculation format before a calculation can be executed.

All such conversions take time. To accelerate the execution of programs the conversion to calculation format is undertaken immediately a number in a program line is entered from the keyboard. The resulting five-byte form is stored in the hidden bytes. The use of this technique enables a considerable saving to be made in the time taken to execute a program, particularly if num-

Byte	Contents	Character
23755	0	?
23756	5	?
23757	11	?
23758	0	?
23759	241	LET
23760	65	A
23761	61	=
23762	49	1
23763	14	?
23764	0	?
23765	0	?
23766	1	?
23767	0	?
23768	0	?
23769	13	

Table 2. The first 15 lines of the screen display produced when the Spectrum program in table 1 is executed.

bers are included within FOR loops, in which case the same conversion would otherwise be undertaken many times. Of course, the time taken to deal with a program line entered from the keyboard is lengthened but not to an unacceptable extent.

The next question, from Hugo Cassidy of Dorchester, follows from the previous one. He asks: **Can you explain the method of encoding numbers on the Spectrum?**

Before explaining the form of encoding used it is useful to explain why it is necessary to encode numbers. The decimal system of counting has become universally-established for everyday purposes because people have 10 fingers and thumbs so we can conveniently count in tens, hundreds, thousands and higher powers of 10. Digital computers, however, count using bits which can be in one of only two states. It is as if they had many hands but each hand had only two fingers. Therefore they can count conveniently in twos, fours, eights, sixteens and higher powers of two. The primary reason for encoding is to convert decimal numbers to binary.

Unfortunately binary, written as a string of zeros and ones, is cumbersome for mere human beings to handle because large numbers of digits are often required. The number 1,000, for example, occupies nine digits when converted to binary. In the ZX-81 and the Spectrum the bits are grouped in bytes containing eight bits each so that the computers can hold a single positive integer number in the range 0 to 255 decimal in each memory location.

Hence it is usually convenient to consider bytes to be the fundamental unit of memory and ignore the constituent bits. Hexadecimal notation — numbers written in base sixteen — are used conveniently to represent bytes because two hexadecimal digits only are required. I think that most readers have enough trouble understanding decimal-to-binary conversions without introducing a further complication. I shall therefore continue to use the decimal version.

```
10    INPUT N
20    PRINT N;"  ";
30    LET A=PEEK 23627+256*PEEK
      23628
40    FOR I=A+1 TO A+5
50    PRINT PEEK I;"  ";
60    NEXT I
70    GOTO 10
```

Table 4: A Spectrum program to inspect the five-byte form of a number entered by the users.

To run the program on the ZX-81 change line 30 to read:

```
30    LET A=PEEK 16400+256*PEEK
      16401
```

Given that it is necessary to convert numbers from decimal to binary, it is logical to use a binary format which is efficient and therefore fast for the computer to use. Two separate formats are used on the Spectrum, a special format for integers, or whole numbers, lying in the range -65535 to 65535 and a floating point format for all other numbers. The ZX-81 uses the floating point format only.

> 'The floating point form is designed to provide the computer with a systematic method of retaining as much accuracy as possible in any given calculation'

The integer format is the simplest to understand and so I shall explain it first. A suitable number, N, is converted to the five-byte form by setting the first and fifth bytes to zero and using the second byte to indicate the sign of the number, 0 for positive, 255 for negative. If the number is positive the value is stored in the third and fourth byte as:

Third byte = N—256 * INT (N/256)

Fourth byte = INT (N/256)

If N is negative the two bytes contain:

Third byte = 65536—N—256 * INT ((65536—N)/256)

Fourth byte = INT ((65536—N)/256

The principal advantage of the use of integer format is that for positive integers the third and fourth bytes are in the form the Z-80A microprocessor uses when addressing locations in memory. Commands such as PEEK and POKE are executed much faster than they would otherwise be if the more complex floating point form were used to store the addresses to which they refer. The format also enables the calculator routines in the ROM to execute much more quickly when calculations involving integers only are performed.

The program in table one can be used to inspect the positive integer form by varying the first line. For example, entering:

```
5    LET A=47
```

will show that 47 is held as 0,0,47,0,0. The negative version cannot be inspected using this program because all numbers are stored in their positive form in the hidden bytes. If a number of preceded by a negative sign it is negated when the line is executed.

The program in table four gives the five-byte form of any number, positive or negative, entered from the keyboard. The program PRINTs the contents of the first item in the variables area, that is the number N entered by the user from the keyboard, because it is the first variable declared in the program. Note that the program should be initiated by entering RUN rather than GOTO 10 because doing so will cause the variables area to be CLEARed, thus ensuring that N is the first variable.

The floating point form is designed to provide the computer with a systematic method of retaining as much accu-

continued on page 122

```
210   LET N=O
220   INPUT X
230   LET S=SGN X
240   LET X=ABS X
250   LET X=2*X
260   LET N=N+1
270   IF X<2147483648 THEN GOTO
      30
280   LET A=INT (X/16777216)
290   LET X=X—16777216*A
300   LET B=INT (X/65536)
310   LET X=X—65536*B
320   LET C=INT (X/256)
330   LET D=X—256*C
340   PRINT "EXPONENT=";160—N
350   PRINT "MANTISSA=";A-
      128*(S=1);" ";B;" ";C;" ";D
```

Table 5. A Spectrum program to calculate and PRINT the floating point form of a number entered from the keyboard.

continued from page 121

racy as possible in any given calculation. Some numbers cannot be completely specified in decimal form. The fraction one-third in decimal form consists of 1.3 followed by an infinite number of threes so that expressing it as 1.3333, for example, is almost, but not exactly, correct. The same problem occurs when binary arithmetic is used.

The solution is to retain only the most significant digits at each stage in a calculation. Provided more significant digits are retained than are required in the answer then in all but the most exceptional circumstances the calculated result will be accurate enough for practical purposes.

The program listed in table five calculates and PRINTs the floating point form of a number entered by the user. The line numbers have been set so that it can be placed in memory at the same time as the inspection program in table four. By entering the same number into both programs the user will see that the calculation is correct.

The program has two parts. The first stores the sign, S, of the number, X, entered by the user. It then multiplies the absolute value of X successively by

2 until the result exceeds 2 raised to the power 31 or 21474383648. The number of multiplications executed is stored in N. The new value of X then lies necessarily between 2 to the power 31 and 2 to the power 32 and so the integer part of the number can be stored exactly in 31 bits. Thus by discarding the fractional residue the number can be stored in four bytes, each containing eight bits with one bit left over to hold the sign of the number. The four bytes together are called the mantissa.

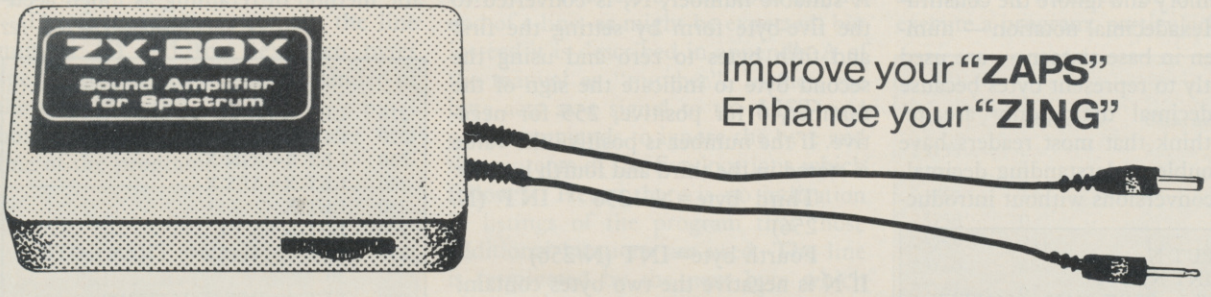
The second part of the program calculates the values held in each of the four bytes and stores them in the variables A, B, C and D and then PRINTs the variables. An adjustment is made to the value of A depending on the sign of the original number. In effect A is less than 128 for positive numbers and greater than or equal to 128 for negative numbers.

The fifth byte of the floating point form is used to store the exponent, that is the number of times that the mantissa must be divided or multiplied by 2 to place the decimal point in the correct position in the number. The program calculates that number using N, the number of multiplications made originally. The result is adjusted by adding 160 so that numbers greater than one have exponents greater than or equal to 128 and numbers less than one have exponents less than 128.

If a number with an absolute value greater than 4294967296, or 2 raised to the power 32, is entered into the program in table five the result will be incorrect because there is no provision for successive division by 2 to yield a number in the required range. It is easy to adjust the program to perform such successive divisions but that is left as an exercise for the reader.

ZX·BOX

A Sound Investment for your SPECTRUM!



Improve your "ZAPS"
Enhance your "ZING"

Bring Arcade-Style sound levels to your games with the
ZX – BOX SOUND AMPLIFIER
(Sound level fully controlable)

Available **NOW** from larger branches of W.H. SMITH & SON

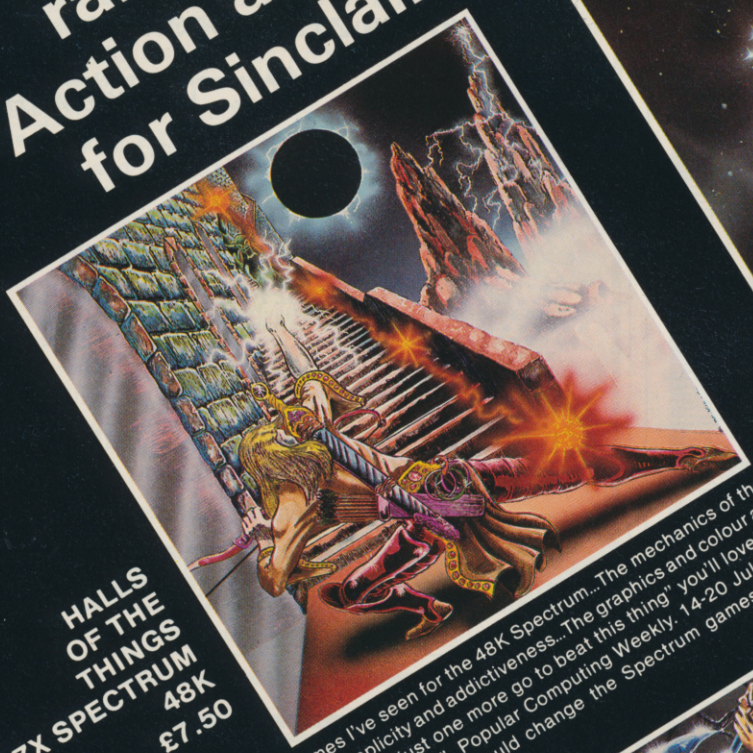
£9·95

Interservice Electronics Ltd., 85/95 Park Street, Southend-on-Sea, Essex

A new and exciting range of Arcade Action and Adventures for Sinclair Computers

COSMIC GUERILLA
ZX SPECTRUM
16K OR 48K
£5.50

Bring your Spectrum to life with the fastest, meanest and most colourful arcade action around. Your task is to zap the relentless waves of alien attackers as they obliterate the force field protecting your supply of ion laser cannons. KEMPSTON JOYSTICK COMPATIBLE
"Incredibly addictive...highly recommended"
...ZX Computing (Aug/Sept 1983).



HALLS OF THE THINGS
ZX SPECTRUM
48K
£7.50

The first ever arcade adventure!
"Spectacular...One of the best arcade games I've seen for the 48K Spectrum...The mechanics of the game are superb, finely balanced between simplicity and addictiveness...The graphics and colour are superb...If you enjoy sitting up until 4am having "just one more go to beat this thing" you'll love this game - I CAN'T RECOMMEND IT HIGHLY ENOUGH"...Popular Computing Weekly. 14-20 July. 1983.
"Excellent and dangerously addictive...a game which could change the Spectrum games scene overnight"...Sinclair User (August 1983).

THE DUNGEON MASTER
ZX SPECTRUM
48K
£7.50

The first adventure to enter into the true spirit of traditional role-playing games.
"Excellent entertainment"...Sinclair User (June 1983).
"Highly recommended for its versatility, originality and quality. Definately well worth obtaining"
...ZX Computing (Aug/Sept 1983).

MERCHANT OF VENUS
ZX81 16K
£5.50

A stunning real-time graphics simulation putting you in control of a leviathan space freighter plus a complex economic scenario combine to produce an exciting game to test your skill and head for business!

ZX81 Games Pack. *"Brilliant"* . . . Interface. *"Excellent"* . . . *Sinclair User* £4.50
Four great arcade games plus a challenging adventure. All written in 100% machine code to run in 1K
ZX81 Monitor and Disassembler £7.50. *"Well written and useful machine code utility"* . . . Your Computer
Written any good software? Send it to us for a valuation and details of our excellent royalties scheme.
Trade & Export terms are available on request including details of our introductory dealer pack.
Please send SAE for our latest catalogue and details of our forthcoming software.
Catalogue FREE with every order.
P&P included. Please add £0.50 per item for overseas orders.
Please make cheques/PO's payable to:

Crystal

Crystal Computing
2 Ashton Way
East Herrington
Sunderland SR3 3RX

IF YOU OWN A
ZX81 or ZX SPECTRUM
YOU NEED THE

ABACUS CONTROLLER

Developed to eliminate tedious swapping of plugs when LOADING or SAVING programs on cassette.

ZX SPECTRUM CONTROLLER
Single switch selection of SAVE, LOAD & AMP modes. Built in amplifier and loudspeaker boosts Spectrum sound output.
Price £14.95 incl.

ZX81 CONTROLLER
Single switch selection of TALK, SAVE, CUE & LOAD modes. Built in microphone/ loudspeaker for fast and reliable program naming and cueing.
Price £9.95 incl.
Money - back Guarantee!

abacus electronics

716 Llangyfelach Road
Treboeth, Swansea SA5 9EL
Telephone: (0792) 799193

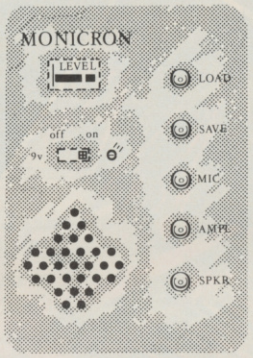
"Of all the Spectrum hardware items I have reviewed, this one most impressed me and is the only one I shall always use."
Quote from PCW.

AT LAST....

From MACQUILLAN ELECTRONICS Comes

MONICRON

THE ONLY INDISPENSABLE ADD-ON FOR
SINCLAIR ZX81 & SPECTRUM



LOAD programs first time every-time via ***VU LEVEL METER***.
SAVE via isolating push-button.
RECORD speech by built-in ***MIC***.
AMPLIFY Spectrum 'Squeak' by built-in ***AMP.**** & ***'SPEAKER***.
RESET crashed programs with power ***ON-OFF*** switch.
MONITOR tape contents.
CUE program start etc.

ALL FUNCTIONS *WITHOUT* DISTURBING A SINGLE PLUG!

Saves time, temper & worn sockets! ***ONLY £14·95*** plus £1·00 p+p

From MACQUILLAN ELECTRONICS
72 MERE ROAD, WIGSTON, LEICESTER.

*ZX81 model has tape'remote'switch - state model when ordering.

NEED TO EXPAND YOUR MEMORY?

AEL 16K RAMPACK
FOR SINCLAIR ZX81
in black case
£17.00* + VAT
(inc. price £19.55)

AEL 16K RAMPACK
FOR VIC 20 COMMODORE
in cartridge
£33.45 + VAT
(inc. price £38.45)

* Special price for limited period only

TWELVE MONTHS WARRANTY

2½% discount on orders over £100
Cheques/P.O.'s (add 50p P & P for single orders) to:
Akintech Electronic Laboratories, The Malthouse, Bay Road, Gillingham, Dorset SP8 4PE. Tel: (07476) 4591. Telex: 477019
Telephone and written enquiries welcome.
Allow 10–21 days for delivery.

AKINTECH ELECTRONIC LABORATORIES

HIRE ZX81/SPECTRUM PROGRAM TAPES

Make the most of your Sinclair ZX81 or Spectrum computer by hiring tapes from the original software library—NOW IN OUR SECOND YEAR with over 2,000 satisfied members!

- Over 950 tapes stocked, offering more than 130 different programs from 40 suppliers (all with their permission)—many of the best currently advertised, plus some specially commissioned—and the range is constantly updated!
- Adventure, arcade and simulation games, many business and other practical programs, utilities, graphics education and much more besides
- Descriptive list makes choice easy
- **FREE** quarterly, illustrated magazine includes tips from a professional programmer, DIY plans, reviews, letters, discount offers—plus our **Top 40 Tapes** chart averaged from thousands of members' scores
- Full-time staff offer you a really friendly, efficient welcome & service
- A fortnight's hire from just £1.20 including VAT and first class p/p—hire just what and when you like
- **NEW! Overseas branches** now operating. **Benelux**: Jacobsmitslaan 75, B-2400 MOL, Belgium (mem. fee 44 & 49 Guilders/790 & 890 Bfr); **Eire:** Softenk, 120 South Circular Rd., Dublin 8 (12.50 punt); **South Africa:** P.O. Box 1769, Manzini, Swaziland.
- All tapes guaranteed loadable
- You may switch from ZX81 to Spectrum membership at any time
- Don't make do with second best! Join the original and biggest library.

YOUR FIRST TAPE FREE if you use this month's coupon!

S-L
The SINCLAIR OWNERS' SOFTWARE LIBRARY
Warren Road, Liss, Hants GU33 7DD.

SPECIAL OFFER THIS MONTH! Join using this coupon and receive your first tape hire (of our choice) **FREE** with your welcome package of magazine, tape catalogue, order forms etc. State main interest:.....

NAME.....

ADDRESS.....

.....

Enclose cheque/P.O. for £7.50 for a guaranteed year's membership (ZX81) or £9.50 (Spectrum). Overseas £2 extra unless with local branch. SU

SPECTRUM 'SCREEN WIDTH' NOW DRAMATICALLY ENHANCED !

Every Sinclair SPECTRUM can now print an EXTRA 10 or 19 characters on all 24 lines with

Micro-print 42/51©

At last, here's a beautifully simple to use software—only solution to raise your SPECTRUM's characters per line print standard by almost 60%! With Micro-print 42/51© you choose whether to screen in a highly professional 51 characters/line mode or an alternative intermediate setting of 42, or even mix both together with Sinclair's own chunky 32 style in full 24 line format. Amazingly Micro-print 42/51© is directly controlled by ordinary variables (no'POKES') easily added to any Sinclair BASIC© program, and fits into less than 1k of user RAM. The entire printable character range remains available at all times, i.e. ROM chr$ 32 to 127, graphic chr$ 128 to 143, and UDC chr$ 144 to 164. You also get separate control of ink—paper—bright—flash—inverse for the new 42/51 sets. Gamesters, adventurers, spreadsheeters, word processers . . . . whoever you are, can you imagine what a 60% screen bonus can do for you? Each Micro-print 42/51© cassette has both 16 and 48k versions of the code plus full operating instructions, and is available now for only £5.00 direct from

Myrmidon Software
PO Box 2, Tadworth, Surrey KT20 7LU

THE STANDARD HAS BEEN RAISED. UNCRAMP YOUR STYLE!

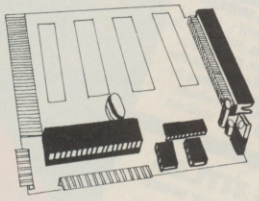
fb tronics
SPECSPANSION

A combined 4-slot motherboard and 24-line bi-directional programmable portboard. supplied with a comprehensive User Manual.

A software programming aid. on cassette, is also available.

Plugs directly into the Spectrum, no extra connectors required. ZX printer and other periphrals can be plugged onto the board's edge connector.

Port connections via edge pins. either solder direct or, we recommend, use sockets which can be supplied.



On Board +5 volts regulator.
Built in address decoding available at three of the motherboard slots for up to a further 12 ports. Manual gives details of addressing.
Provision for 4 additional cards. either your own or, coming soon, RS232/centronics interface. A to D converter, relay box interface. Joysticks.

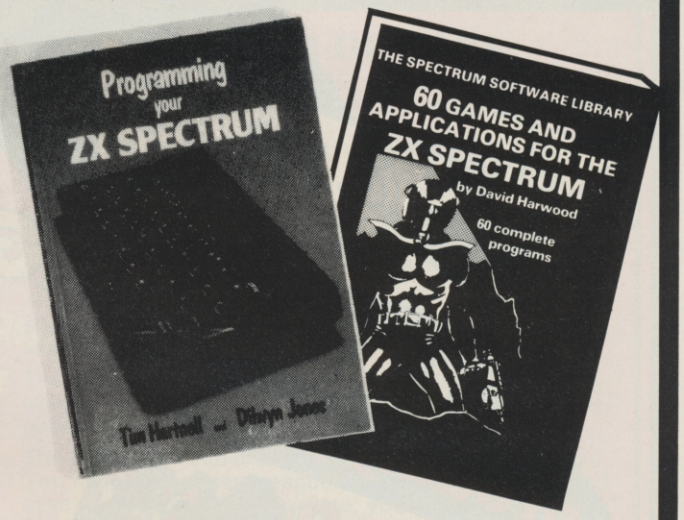
Upgrade in stages. the board can be supplied drilled only to take the additional connectors later on with one or more of the connectors fitted as required.

Prices:	
Port/motherboard drilled only	**£18.50**
Port/motherboard fitted with additional connectors (up to 4), per connector, add	**£3.50**
Motherboard connectors loose, per connector	**£3.00**
Port sockets, per set of 6	**£1.40**
Programming Aid cassette	**£3.50**

For boards. add 80p postage and packing; for other items, add 40p. Orders dispatched within 48 hours.

Dept SU
F B Tronics, Unit 2, Park Brook Industrial Estate, Park Street, Lye, Stourbridge, West Midlands, DY9 8SS

SPECTRUM



Make the most of your Spectrum, with these acclaimed books from the experts!

( ) **INSTANT SPECTRUM PROGRAMMING** — Tim Hartnell. Spoken word C-60 cassette with book containing many major programs, to teach you programming the Spectrum from first steps. The ideal guide if the Spectrum is your first computer. £4.95.

( ) **CREATING ARCADE GAMES ON THE ZX SPECTRUM** — Daniel Haywood. Full programming instructions to improve and enhance your own work, with 17 major programs listed in full as a bonus. £3.95.

( ) **PROGRAMMING YOUR ZX SPECTRUM** — Tim Hartnell and Dilwyn Jones. 200 pages, more than 100 programs, to take your through programming the Spectrum from the beginning. Written by Tim Hartnell, the most widely published ZX author in the world. Recommended by PCW, Sinclair User and Personal Computer Today. £6.95.

( ) **BEYOND SIMPLE BASIC — DELVING DEEPER INTO YOUR ZX SPECTRUM** — Dilwyn Jones. When you've mastered introductory programming on the Spectrum, you need this oustanding guide to enhanced programming techniques and concepts. £7.95.

( ) **60 GAMES AND APPLICATIONS FOR THE SPECTRUM** — David Harwood. Arcade games, intelligent board games, brain games and utility programs, they're all here. Just £4.95.

( ) **GAMES ZX COMPUTERS PLAY** — edited by Tim Hartnell. Thirty great games for your ZX computer, 15 for the Spectrum, 15 for the 16K ZX81. Only £3.25.

Interface Publications,
Dept. SC
44-46 Earls Court Road, London, W8 6EJ.

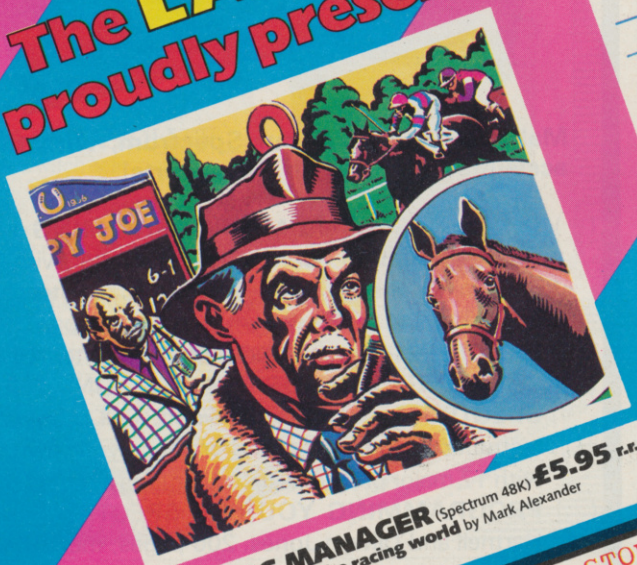
Please send me the books indicated above. I enclose £_____

Name _____

Address _____

Virgin Games

The LAUGHING SHARK Proudly presents OUR fab NEW releases



RACING MANAGER (Spectrum 48K) **£5.95 r.r.p.**
All the thrills of the racing world by Mark Alexander
VGC 1005

LOJIX (Spectrum 48K) **£5.95 r.r.p. An intriguing intellectual puzzle – beat the puzzle, win the money**
by Steve Webb **VGC 1006**

. . . STOP PRESS . . . OCT 3 RELEASE . . . STOP PRESS . . . OCT 3 RELEASE . . .

QUETZALCOATL by Gareth Briggs **VGC 1007**
£5.95 r.r.p.
You have been **imprisoned** in an **Aztek Temple** by bandits. Your only means of **escape** is to make your way carefully through the passages, avoiding the **pitfalls**, collecting **beads** to pacify the natives and risking the vengeance of the **Aztec Gods.**
Six skill levels and **plenty of fun** in this 48K **exciting graphic adventure.**

ROBBER by Keith Mitchell
VGA 1008 £5.95 r.r.p.
A three part **criminal adventure** to warn you off a life of crime!
First you must **get to the safe and crack it,** avoiding the **police patrol,** then you must **escape** with your ill gotten gains from the heavily fortified house avoiding **numerous perils** designed to thwart you and convince you that **crime doesn't pay!** – unless, of course, you can **escape** . . .

SPECTRON by Mark Kirkby
VGC 1009 £5.95 r.r.p.
100% Machine Code, 100% addictive arcade action game.
Surrounded by **murderous robots** determined to get you – **beat them** at their own game or **suffer the consequences.** (Of course you can always have another go and that is why it is so **addictive**).

LOST by John Hunt **VGC 1010**
£5.95 r.r.p.
Lost in a clearing surrounded by **forest** and **mountains** with only **five days supplies** – you must reach civilisation, scavaging for **food, water** and **shelter,** trying to avoid the less desirable wildlife and praying for clement weather.

Look out for OUR exciting NOVEMBER releases £5.95 r.r.p.

GAMES AVAILABILITY
If your **LOCAL RETAILER** is not yet stocking **VIRGIN GAMES** – tell him he should be – but, however, you can **ORDER DIRECT** from **"I'VE GOT NO GOOD LOCAL RETAILER"** dept., **VIRGIN GAMES, 61-63 PORTOBELLO ROAD, LONDON W11,** enclose a cheque or postal order for the right amount and **DON'T FORGET** to put your name and address – people do, you know!

VIRGIN GAMES GANG
Our **GANG** is growing in numbers all the time, and everybody who buys one of our **NEW GAMES** will **RECEIVE:**
a year's **FREE MEMBERSHIP** of the **GAMES GANG;**
FREE ENTRY in the next **VIRGIN GAMES GANG DRAW;**
6 FIRST PRIZES, consisting of a **VIRGIN DAY OUT** – a trip on the **VIRGIN GAMES FUN BUS** to the **VIRGIN MANOR RECORDING STUDIO** in Oxfordshire. And then be our guest at the famous **KENSINGTON ROOFTOP NIGHTCLUB, "THE GARDENS";**
50 SECOND PRIZES of **VIRGIN GAMES T-SHIRTS;**
100 THIRD PRIZES of **VIRGIN GAMES POSTERS.**

THE "I WANT TO BE RICH AND FAMOUS" DEPARTMENT
If you have a yearning to be **RICH AND FAMOUS** and have written an **ORIGINAL GAMES PROGRAM,** with good graphics, for any of the popular home computers other than the ZX81, **PLEASE SEND A CASSETTE VERSION** (with details) **TO US.**

VIRGIN GAMES BUS TOUR
VIRGIN GAMES ARE ON THE ROAD! Look out for the **VIRGIN GAMES FUN BUS.** From **SEPTEMBER** onwards our eye-catching double-decker, games bus will **VISIT TOWNS** throughout the **U.K.,** demonstrating our games to the public, in conjunction (where possible) with local radio stations.

OUR EXCITING EXISTING TITLES
(Reviews courtesy of the 'Don't just take our word for it dept . . .')
SHEEPWALK It is one of the best games around for the Spectrum **Personal Computer Games – Summer '83** £7.95
GOLF There are Golf games and Golf games, and this is one of the best I've seen **Home Computing Weekly – June '83** £7.95
STARFIRE A very enjoyable game ***** **Home Computing Weekly – June '83** £7.95
YOMP It (Virgin Games) has started off tastefully enough with a game based on the Falkland's event of last year, called 'Yomp' and has impressed it's competitors . . . **Personal Computer World – July '83** £7.95

GSH

All our fun-to-play games are available from **BOOTS, MENZIES, DIXONS, THE GAME CENTRE, PHOTOMARKETS, VIRGIN RECORDS** and all **GOOD** computer shops everywhere.

now available

30 HOUR BASIC

SPECTRUM EDITION

£5·95

NEC'S best selling programming course now published for the Spectrum micro.

Available from bookshops or direct from NATIONAL EXTENSION COLLEGE Dept. 48 18 Brooklands Avenue, Cambridge CB2 2HN

SINCLAIR OWNERS

START THE NEW FOOTBALL SEASON THE BEST POSSIBLE WAY, WITH HARTLAND SOFTWARE'S POPULAR

FOOTBALL POOLS PROGRAM

The program will list out, in order of preference, the sixteen most likely score draws; also the sixteen most likely homes, draws and aways.

The program can pick out those results on the book-makers' fixed odds coupons that have been given over-generous odds. It calculates your expected profit!

The program is initialised with the current league table. You can update these league tables week by week and save them on another cassette; you can even enter the Australian league in the summer. In other words, this program never becomes "out of date"!

All programs are recorded on a top quality cassette (usually Sony) and are accompanied with an instruction leaflet giving brief details of the theory involved.

Prices: For ZX81 (16K): £8.95; For ZX Spectrum (48K): £9.95 including post & packing, from:

HARTLAND SOFTWARE

Dept. S, 8 Penzance Place, London W11 4PA

A world of activity for you and your Sinclair

Whether you have a ZX80, ZX81 or Spectrum — we can show you there's far more to your Sinclair than you ever thought possible. That's the *active, lively* world of **Sinclair User** — the first magazine written specially for everyone who owns or uses a Sinclair computer.

Every month, there is a whole range of games, business ideas and bright new ways to learn. There is the Sinclair User Club, with special exclusive member offers. There are technical facts, development news and advice, plus hints from other users and answers to queries — in fact everything you need to be an interested, informed and ACTIVE Sinclair user.

There's just one problem — **Sinclair User** sells out fast! So make sure you don't miss your copy: order it today from your newsagent — or complete the subscription form below and we will send it to you direct, every month.

Mail to: ECC Publications Limited, 196–200 Balls Pond Road, London N1 4AQ Yes — I'd like to subscribe to Sinclair User (12 issues — price £11.00 including P&P) I enclose a cheque for £ _____

Please charge my credit card: Card name _____ Number _____

Name _____ Address _____

Signature _____ Date _____

NB This offer applies to UK subscribers only. Overseas rates available on request.

University Software

LIBRARY OF ADVANCED MATH/STAT/ECON

TAPE 1: MATRIX OPERATIONS — SPECTRUM £6.95, ZX81 £5.95

Side A: Inversion, multiplication, addition, subtraction and scalar multiplication of matrices and vectors within one single program. Any output can in turn be used as the input of the next operation without re-typing. Capacity: 16K ZX81: 25×25, 16K Spectrum: 17×17, 48K Spectrum: 48×48.
Side B: Determinants of square matrices.

TAPE 2: POLYNOMIALS — SPECTRUM £6.95, ZX81 £5.95

Side A: Includes quadratic equations (as degree 2 polynomials) and Newton-Raphson and half-interval search methods for higher degree polynomials. Computes the roots with 8 digits of precision.
Side B: You can plot polynomials in any interval and examine their roots, extremum points.

TAPE 3: INTEGRATION — SPECTRUM £6.95, ZX81 £5.95

Side A: Integration of functions by Simpson's and trapezoidal rules. Also computes the area enclosed by two functions.
Side B: Plot of integrals. Integration can be visualised on the screen.

TAPE 4: REGRESSION — SPECTRUM £7.95, ZX81 £6.95

Side A: A highly developed multivariate regression program featuring Log/Ln option on each variable (thus allowing exponential and geometric regressions), R^2, corrected R^2, standard errors, t-statistics, F-statistics, degrees of freedom, Durbin-Watson statistic, interpolation. Capacity (no of variables × no of observations); 16K ZX81: 2×500, 5×250, 10×140, 16K Spectrum: 2×220, 5×100, 10×50, 48K Spectrum: 2×1800, 5×900, 10×500.
Side B: Plot of bivariate regressions. You can see how your computer draws a best-fitting line on a set of numbered data points.

TAPE 5(a): LINEAR PROGRAMMING — SPECTRUM £7.95, ZX81 £6.95

Side A: A user friendly optimisation program capable of handling all sorts of linear programming problems (any combination of $<,=,>$, constraints and $x_i>$, $x_i<0$, $-\alpha < x_i < \alpha$ sign constraints). Features the cannonical equivalent of the primal, values of slack variables and the dual. Capacity (no of variables × no of constraints); 16K ZX81: 10×23, 15×20, 20×15, 16K Spectrum: 10×10, 48K Spectrum: 10×50, 25×40, 50×30.
Side B: Solutions of simultaneous equations.

TAPE 5(b): PROFESSIONAL LINEAR PROGRAMMING — £14.95

Available for 16K ZX81 and 48K Spectrum with above features plus 'save-data' and 'change-data' facilities. Any single data entry can be changed without re-typing the whole data.

- Cheques payable to:
  UNIVERSITY SOFTWARE
  29 St Peter's Street
  London N1 8J9
- All incl. prices for the UK.

Tapes 1 – 5(a) Spectrum £35
ZX81 £30

ZX81 + SPECTRUM: SOFTWARE + BOOKS

also BBC Micro

Cambridge Computer Store

1 Emmanuel Street
Cambridge CB1 1NE
Telephone (0223) 358264/65334
(closed 12.30 – 1.15 except Saturday)

Use your joystick with all your favourite arcade games

SPECTRUM PROGRAMMABLE JOYSTICK INTERFACE

Compatible with all Atari type joysticks (Kempston, Quickshot etc.)

Incredibly simple to program, just press a key on your Spectrum and move the joystick in the direction that you require. From then on, moving the joystick will give exactly the same results as pressing the key.

Full, simple to follow, instructions supplied.

ONLY £22.50 (plus £1 p&p)

NEW SPECTRUM SOFTWARE

(48K) **ROULETTE** Up to 6 players. Multiple bets allowed. Realistic table and spinning wheel. Lose your shirt in the comfort of your own home. **ONLY £4.95**

(48K) **SPECTRUM GAMES II** (Cheeky Chimp, Spec-Man, Spec-Panic, Berserker, Frogger). **ONLY £4.95**

(16K) **SPECTRUM GAMES III** (Cosmianoids, Dodgem, Stunt Driver – All fast machine code). **ONLY £4.95**

(16K) **POT-POURRI** (Track 'n Attack, Blackjack, Superscript, Char-Wallah) **ONLY £4.95**

(48K) **TUBE TRAIN TERROR** Can you overcome the perils on your journey and deposit the bullion at the Bank? **ONLY £5.95**

(16K) **SPECTRUM GAMES I** (Airport, Alien, Crabs – Reviewed in Sinclair User/What Micro) **SPECIAL OFFER £3.95**

(16K) **ANT ATTACK** Fight the marauding ants in this fast machine code arcade game. Beware of the rogue ant. 3 levels of play. **ONLY £4.95**

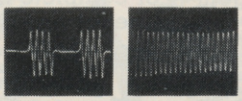
New Educational games available for 7–11 year olds, designed by the deputy headmaster of a primary school. **JUPITER ACE software now available.**

NEW

JRS FAST LOAD SYSTEM

Left: 2 data bits using ZX81 load

Right: 21 bits loading in same period using FAST LOAD



Now you can use the widely acclaimed JRS Fast Load system on your own cassettes. No additional hardware required. Allows a 16K programm to load in under a minute. ONLY £8.50

Full range of ZX81 software available. Send S.A.E. for lists.

GRAPHICS TOOLKIT

(16K or 48K Spectrum)

Over 40 machine code routines that you can call from your BASIC programs to improve your screen displays. Complete with demonstration program plus tips on producing fast routines for kaleidoscopic screen displays that are a favourite demonstration of the BBC micro.

ONLY £5.50

JRS SOFTWARE

19 WAYSIDE AVENUE, WORTHING, SUSSEX. BN13 3JU Telephone: (0903) 65691

Send £1.00 for our new comprehensive Summer Catalogue (refundable against first purchase). Please include large stamped addressed envelope.

24 hr Ansafone for Access and Barclaycard orders

ORDER FORM: To JRS SOFTWARE LTD, (Dept.), 19 Wayside Avenue, Worthing, West Sussex BN13 3JU

Please supply the following:–

Quantity	Description	Price

(VAT and p&p are incl.) Total £

I enclose my cheque/P.O./Money Order for £_____
or charge my Access/Barclaycard Account No:

_____

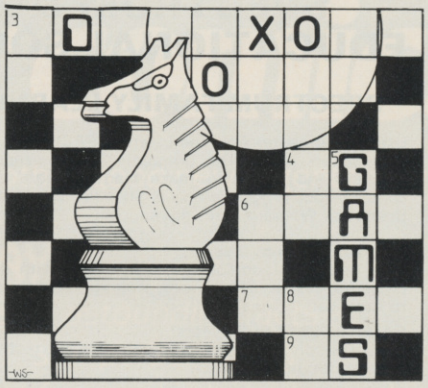
Name_____

Address_____

_____ Signature_____

Quentin Heath discovers that the Artic series of adventures have been causing concern.

Castaways lost on island of Espionage



THE ARTIC adventures, A, B and C have been causing a great deal of concern among readers of this column. Many people think that the games are unsolvable but Artic says that there is an answer to all the problems which are encountered when the programs are run.

The program which is causing the most difficulty is **Espionage Island.** At the beginning you are in an aircraft which is hurtling out of control towards earth and a spectacular crash. Once you have landed it is necessary to defeat the enemy on the island and to discover its mysterious secret.

Unfortunately some hapless adventurers have not been able to get out of the aircraft before it crashes. That seems to be a common problem. It seems logical that there would be a parachute available in an aircraft but the first problem is finding it. You may have tried everything. One reader tried to get into the captain's empty cabin but to no avail.

Getting the parachute is quite simple. The commands are 'Take parachute' followed by 'Wear parachute'. If you are not careful at that point you could finish in mid-air with no visible means of support.

The correct way to make your exit is to 'Open door' and not 'Pull the handle'. If you take the latter course you will be flung into open space and have to make a landing without a parachute.

You can jump out of the aircraft without further problems but remember that you should 'pull cord' to allow your parachute to open, as soon as you are out of the aircraft.

When you land on the island tell the computer to 'drop chute' to hide all evidence of it from the enemy. Strangely, that is the most difficult part of the adventure for many players. Once past that point you can progress fairly rapidly.

One area of the adventure which is rarely discovered is a special object hidden in the wreckage of the aircraft. Tell the computer to 'Touch dark corner' and you will discover a string of lucky beads. You may be inclined to leave them at the site but you should not, as you will need them later.

From the aircraft wreckage you can go south or east. If you go east for two moves you will find burnt bushes and arrive in a jungle clearing. It is then a short hop south and then east before you encounter a native girl who will prove useful.

Some readers have tried to interrogate the girl but that will prove useless. All she will understand is a little bribery and corruption. She will barter with you and the only thing which you have is the string of beads. Offer those to her and she will give you a weapon.

The native's weapon seems just as useless as the string of beads. You will find that you can do little with it in the present situation. That is because it was given to you for another purpose, which is much removed from the native girl and the plain.

To learn the purpose you should make three moves west, one move north-west and past the aircraft wreckage again you will find yourself in the guard's clearing. You should be careful there as there are enemy guards patrolling the area and you would not want to be locked up.

If you go south again you will find the guard's hut and it is at that point that you must use the weapon. Killing the guard is not a vicious random act. Despite your doubts everything has a logical flow in this adventure. If you do not kill him you could be locked up and encounter further difficulties, like trying to escape from an enclosure.

From the guard's hut you can travel south to the river cove. The name of the location should suggest to you that there is a boat somewhere near. If it does not you should try to start thinking in those terms if you want to complete the adventure. There is a reason for every event and location, no matter how unlikely it may seem at the time.

From the river cove you will discover a boat and can start your way down the river to the rest of the island.

There is another way around the island if you go back to the grass plain and the native girl. If you go south from there you will find yourself on an eroded bank. A crevasse lies in front and a stick lies on the grass verge.

You have to do something very illogical with the piece of wood. It should be dropped into the crevasse. If you move forward after dropping the stick you will not fall into the crevasse. The stick has turned into a bridge which you can cross.

The location following the bridge is a rocky slope and you are given two directional options. What you should not do, if you are a newcomer to the game, is to go east.

That direction will take you to the swamp. If you go into the swamp keep a map record of which directions you take or you will finish in the quicksand.

There are several objects which can be collected in the quest for the secret of the island. The string of beads and the weapon are just two of them. The list of all possible finds is lengthy but it includes a penlight, a torch, a branch, a gun, a match and a rope.

Some of those items will be found in the vicinity of the aircraft wreckage. Usually the objects have a link with their surroundings. For instance, you would expect to find a boat near a river.

Espionage Island requires a great deal of thought to solve and is particularly suited for expert adventure gamers. All that is needed to crack the secret of the game is an understanding of the situations as related to the objects. When you can get that the rest should be relatively easy.

SPECTRUM & ZX81 EDUCATIONAL SOFTWARE

SPECTRUM FAMILY LEARNING SERIES

Use our Computer Assisted Learning PACks to help your children with their school work. The programs in the series use moving colour graphics and sound to make learning more enjoyable. Each pack contains four programs and is suitable for use with the 16K or 48K Spectrum. Program notes are supplied.

CALPAC FL1 (5 to 8 years) **£9.50**
Tens and units addition and subtraction with detailed help facilities; powerful, easy to use drawing program; English comprehension applied to American Indians.

CALPAC FL2 (7 to 10 years) **£9.50**
Roman history; spelling tester with easy entry of your own lists; flexible table-tester; homophones.

CALPAC FL3 (9 to 12 years) **£9.50**
Nouns, verbs, adjectives and adverbs; tenses of verbs; biology of the flower; long division tutor.

The programs are ideal for the ages stated, but could be used by anyone requiring revision of these areas of study.

CALPAC C1 O-LEVEL CHEMISTRY £6.50

Four clearly presented revision/tutorial programs. The subject matter has been carefully structured to cover the most important aspects of:

- ★ Elements, compounds and mixtures.
- ★ Structure, bonding and properties.
- ★ Redox, electrolysis and the activity series.
- ★ Acids, bases and salts.

48K Spectrum and 16K ZX81 versions of the cassette are available. Please specify which you require.

Professional Computer Assisted Learning materials from:
CALPAC COMPUTER SOFTWARE
108 Hermitage Woods Crescent, St Johns, Woking, Surrey GU21 1UF.

WIN THE 48k POOLS?

SPECTADRAW 2

SPECTADRAW 2 is a Pools Prediction Program for the 48K ZX Spectrum Microcomputer.

The program looks at the recent form of the teams playing in each week's English and Scottish football league matches and then refers to a large database to see what has happened in the past when teams with similar form met. By combining the lessons learnt from the past with the teams' current league position, the program generates a draw probability factor for each match. It can then identify the matches which are likely to yield draws and output suitable predictions. It will also output the least likely draws for the benefit of those who prefer the fixed odds lines on coupons.

The program is supplied complete with a database tape containing data on over 7500 matches and a comprehensive instruction manual.

Program, database (both on high quality cassette) and instruction manual **£12.95** inclusive. (Cheques/PO's payable to B.S. McAlley).

SPECTADRAW
1 Cowleaze, Chinnor, Oxford OX9 4TD

BARGAIN-HUNTERS READ *THIS!*

Whatever your model of Sinclair computer—you can get HOURS of fun, intellectual satisfaction and education for just 95p per month!

A bargain?
That's **Sinclair Programs** magazine—the fat, glossy magazine that's PACKED with original, tested programs for you to load and run.

With **Sinclair Programs** every month you can build the library of programs that suits your mood: in recent issues we have challenged our readers with programs to test their skill at Sharpshooter or Laser Cannon . . . jolt their brain cells with Quadratic Equation or Monster Maths . . . or take a practical turn with their own word processor program or graphic generator.

That is just a fraction of what you get from **Sinclair Programs**. Each month we have 40 programs for owners of ZX80s, ZX81s and Spectrums. But make sure you don't have to hunt TOO far for your bargains—**Sinclair Programs** always sells out quickly, so order yours TODAY from your newsagent, or fill in the form below and we will send it direct to you, every month.

Mail to: ECC Publications Limited, 196–200 Balls Pond Road, London N1 4AQ Yes — I'd like to subscribe to **Sinclair Programs** (12 issues — price £13.20) I enclose a cheque for £ ____ Please charge my credit card Card: name ____ Number ____ Address ____ Name ____ Date ____ Signature ____ NB This offer applies to UK subscribers only. Overseas rates available on request

The Galaxy's FIRST ever computer comic!

Zooming into touchdown at WH Smiths, John Menzies and other good newsagents now and every fortnight . . . only 40p.

Order your copy TODAY!

Bursting with great new comic strips . . . exciting stories . . . astounding facts . . . big prizes . . . competitions . . . fascinating quizzes . . . star personalities. And that's just the start of Britain's newest, brightest, most fun-packed comic ever!

LOAD RUNNER

It's the only comic for the age of the computer – it puts the rest back with the dinosaurs!

Only 40p

AVAILABLE NOW

and every fortnight . . . order your copy **TODAY.**

Play in the big league — with only the best, newest programs!

We've searched for brilliant new program sources throughout the U.K. and North America to find an exciting collection of new games — and business programs — many of which cannot be bought by mail order from any other source!

Every month, we'll be adding to our catalogue to bring you the best of new games, new business, educational and household software. And the good news is — **we're specialising in programs for your Sinclair!**

With our special new deal — you just CAN'T GO WRONG.

* A free offer every month [this time it's a free blank C20 cassette with every two games ordered]
* A money-back guarantee if you're not entirely satisfied with your purchase — that's how confident we are about the quality and value!

All you have to do is look at our first HOT selection, then order quickly to be among the first to own these games of skill, intelligence and excitement [fast delivery is another of our specialities — so you could be using these new programs SOON].

FREE BLANK C20 COMPUTER CASSETTE WITH EVERY TWO CASSETTES YOU ORDER!

Remember there's no limit to the number of free cassettes you receive if your order justifies them — so why not get together with friends or user group members and share the freebies?

GUARANTEE

Order with complete confidence. If you are not entirely satisfied with the quality of your purchase return it to us within 7 days and we will provide a replacement.

GREAT VALUE! TREMENDOUS SELECTION! PLUS A FREE OFFER EVERY TIME!

Fill in the order form right away — we're guaranteeing fast delivery, quality and satisfaction [after all, we want you to come back for more!]

The Software Workshop, Yew Tree, Selborne, Hants GU34 3JP

Here's a whole NEW selection of the latest games, the best-value software for your ZX-81 or Spectrum.

ZX81 Software

1-01 Stock Market — £3.95
Buy and sell your way to millions! 16K RAM

1-02 Football League — £3.95
First division fun for the soccer enthusiast. 16K RAM

1-03 Test Match — £3.95
Match your wits alongside the superstars. 16K RAM

1-11 Arcade Action — £4.95
Overtaker/Missile Man/Space Fighter/ Pilot/Greedy Gobbler/Extra Terrestrial. 1K

1-12 Avenger — £4.95
Avoid missiles and bombs to become the ruler. 16K RAM

1-13 Protector — £4.95
Defend your own ship from oncoming attackers. 16K RAM

1-21 Football Manager — £5.95
Manage your team through a hectic league season! 16K RAM

1-31 Comp-U-Share — £9.95
Investment management program for unit trusts, shares and loan stocks. Complete documentation included. 16K RAM

1-32 Comp-U-Tax — £9.95
Accurate personal income tax calculator for 82/83 tax year. Full documentation included. 16K RAM

Spectrum Software

2-12 Avenger — £4.95
[See 1-12 under ZX81]. 48K RAM

2-13 Sentinel — £4.95
Guard your mother ship against alien attacks. 48K RAM

2-14 Meteor Storm — £4.95
Spectrum version of the ever-popular arcade game. 16K or 48K RAM

2-15 Star Trek — £4.95
Popular space program brought to life by excellent graphics. 48K RAM

2-21 Frogger — £5.95
Manoeuvre the frog across the road avoiding heavy traffic. 48K RAM

2-22 Crazy Balloons — £5.95
Guide the balloons round the maze without bursting. 48K RAM

2-23 Arcadia — £5.95
The expert's version of the popular 'Invaders' game. 16K or 48K RAM

2-24 Golf — £5.95
The finest of golf handicap games. 48K RAM

2-25 Test Match — £5.95
More exciting than the real thing! 48K RAM

2-26 Derby Day — £5.95
This favourite has to be a winner. 48K RAM

2-27 Rescue — £5.95
Rescue the Princess from marauding patrols. 48K RAM

2-28 The Orb — £5.95
Discover the Orb in the depths of the temple but watch the monsters. 48K RAM

2-29 Jackpot — £5.95
The harmless way to take on the one-armed bandit. 48K RAM

2-31 Football Manager — £6.95
See 1-21 under ZX81. 48K RAM

2-41 Comp-U-Share — £9.95
See 1-31 under ZX81. 48K RAM

2-42 Comp-U-Tax — £9.95
See 1-32 under ZX81. 48K RAM

To: The Software Workshop, Yew Tree, Selborne, Hants GU34 3JP

I wish to order the following programs. I understand that:

* I will receive a FREE blank cassette with every 2 programs ordered
* I can return products within seven days if not entirely satisfied and receive a full refund or replacement programs to the same value.

Ref No	Qty	Title	Price

Postage, packing and handling: add 45p for the first cassette, and 25p for each additional cassette. Non-UK orders add extra 50%

Total

I enclose a cheque/postal order for _____

Name _____

Address _____

SU 10

(Allow 28 days MAXIMUM FOR DELIVERY)

ORWIN SOFTWARE: ZX81 & SPECTRUM

SUPER SOFTWARE AT LOW PRICES

"Michael Orwin has built a reputation for value-for-money software and his Cassette 4 offers quantity as well as quality."

Sinclair User, October '82

"If each game was on a separate tape and selling for £5 each I would still recommend them. But all on one for £5 . . . ! This sort of value for money just has not been seen before on any personal computer."

"Without sounding pushy I would like to conclude this review by saying — if you have a ZX-81 and like games, then you should buy Michael Orwin's cassette 4."

2 extracts from *ZX Computing,* Oct/Nov '82

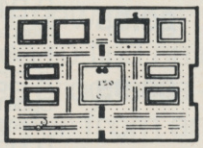
"Eight games, including an excellent version of the Scramble arcade game . . . Easy to operate, graphically impressive and good value for money."

The Times, Saturday 11th December 1982 (about Cassette 4)

NEW! FOR 16K SPECTRUM

(will also run on 48K Spectrum)

CASSETTE A **Ten programs for £6**



GHOST GOBBLER Eat the ghosts before the ghosts eat you. Eat a star and you can chase the ghosts for a while.

ALIENKILL Control lasers, rockets and a force-field to stop the aliens from landing.
MOUSETRAP Trap the mouse in the corner but not anywhere else.
REVERSI A game of skill with simple rules but sophisticated tactics. Play against the computer.
LASER DEFENCE Control the laser sight to shoot down the alien ships. Machine code sound routines.
TANK BATTLE For 2 players simultaneously or play against the computer. Each player has 2 rotate controls and move and fire controls. The tanks fire steerable missiles.
PHOEBUS A puzzle.
BLACKSPOT Gobble the stars and avoid running into black spots created by crossing your own path.
CUBE Manipulate a cube any size from 2×2×2 to 7×7×7.
MINEFIELD Collect the crowns while avoiding the mines and the electrified fence.

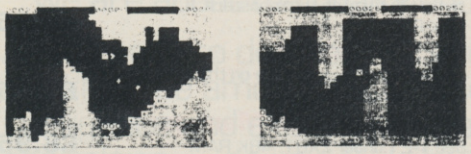
plus an extra . . .

GRAPHIC DEMO Did you know your Spectrum could do all this!?

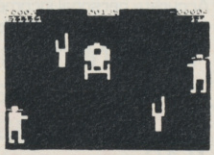
CASSETTE 1, eleven programs (including 7 in machine code) for 1K ZX81 **£3.80**	**CASSETTE 2,** ten games in Basic for 16K ZX81 **£5**	**CASSETTE 3,** eight programs (including 1 in machine code) for 16K ZX81 **£5**

CASSETTE 4 **8 games for 16k ZX81** **£6**

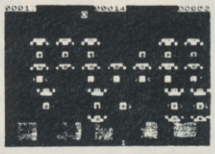
ZX-SCRAMBLE (machine code) with 3 stages.
Bomb and shoot your way through the fortified caves.

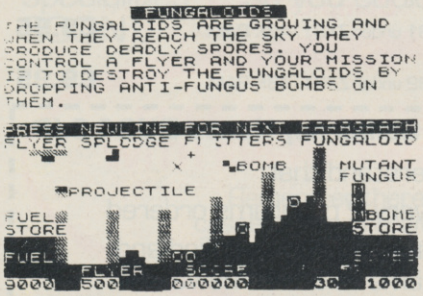


GUNFIGHT (machine code)



INVADERS (machine code)





GALAXY INVADERS (machine code)
Fleets of swooping and diving alien craft to fight off.

SNAKEBITE (machine code)
Eat the snake before it eats you. Variable speed. (very fast at top speed).

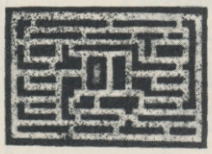
LIFE (machine code)
A ZX81 version of the well known game.

3D TIC-TAC-TOE (Basic)
Played on a 4×4×4 board, this is a game for the brain. It is very hard to beat the computer at it.

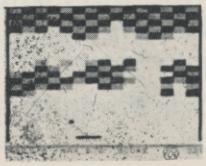
7 of the 8 games are in machine code, because this is much faster than Basic. (Some of these games were previously available form J. Steadman).

CASSETTE 5 **8 games for 16k ZX81** **£6**

BYTE-MAN (machine code)
(previously available from Mindseye)

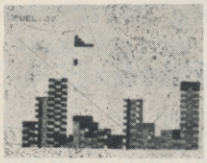


BREAKOUT (machine code)



SPACE RESCUE (machine code)
(previously available from Mindseye)

BLITZ (machine code)



PLANETOIDS (machine code)
Rotate, move, fire and hyperspace controls. Wide range of choice of speed and difficulty.

DODGEMS (machine code)
Dodge the computer's car while eating the dots.

DRAUGHTS (machine code)
Three skill levels.

MERCHANT (Basic)
Make your fortune on trading voyages in the Mediterranean and beyond.

7 of the 8 games are in machine code because it is much faster than Basic.

Please make cheques payable to ORWIN SOFTWARE.
ORWIN SOFTWARE, Dept. OSU, 26 Brownlow Road, Willesden, London NW10 9QL.
ZX81 & SPECTRUM SOFTWARE WANTED

SOFTWARE DIRECTORY

LAST MONTH *Sinclair User* began a new service to readers — a software directory. Last issue we published the first part of a list of all the software of which we know on the Sinclair market, with the machine on which it should be played, the publisher and the type of program. It is completed here.

If we have reviewed a cassette we shall give it a rating known as the Gilbert Factor, named after our software editor John Gilbert. Although the final figure is out of 10 it is the result of complicated calculation involving a number of factors which are taken into account when assessing how good a cassette is.

The factors include value for money, the layout of the screen instructions, conciseness of the program and its speed of operation, the accomplishment of the task it aims to achieve, the innovation of concept, and the use it makes of the machine.

While trying to ensure that all software is dealt with it is inevitable that some will be omitted. We will remedy any omissions later.

Lack of space means that we cannot publish the complete list in one issue. The remainder of the list will be published next month and we will repeat this month's one month later.

Any suggestions for its improvement will be welcomed.

Name	Machine	Company	Type	Gilbert factor
NightFlite	16K Spec.	Hewson	Sim.	5
Nowotnik Puzzle	16K Spec.	Phipps	Game	7
Nowotnik Puzzle	16K ZX-81	Phipps	Game	*
Odds-on	16K Spec.	RSD	Game	*
O Level Chemistry	48K Spec.	Calpac	Educ.	*
O Level Chemistry	16K ZX-81	Calpac	Educ.	*
O Level Fench Revision	16K ZX-81	Rose	Educ.	*
O Level Maths Revision	16K ZX-81	Rose	Educ.	*
O Level Physics	16K Spec.	Homestudy	Educ.	*
O Level Physics	48K Spec.	Think Tank	Educ.	*
Omnicalc	48K Spec.	Microsphpere	Bus.	9
Orbiter	16K Spec.	Silversoft	Arcade	7
Original Superchess	48K Spec.	CP Software	Tradtitional	*
Original Superchess	16K ZX-81	CP Software	Traditional	*
Othello	16K Spec.	CP Software	Traditional	*
Othello	16K Spec.	M.O.I.	Traditional	*
Othello	16K ZX-81	M.O.I.	Traditional	*
Payroll	48K Spec.	Hilderbay	Bus.	9
Payroll	16K ZX-81	Hilderbay	Bus.	*
Payroll	32K ZX-81	Soft Tech	Bus.	*
Payroll	48K ZX-81	Soft Tech	Bus.	*
Peek	16K Spec.	Zen	Utility	*
Penetrator	48K Spec.	Mel. Hse.	Arcade	7
Personal Banking System	48K Spec.	Hilton	Bus.	*
Personal Banking System	16K ZX-81	Hilton	Bus.	*
Pharoah's Tomb	16K ZX-81	Phipps	Adven.	*
Pilot	16K ZX-81	Hewson	Simulation	7
Pimania	16K ZX-81	Automata	Simulation	*
Pimania	48K Spec.	Automata	Simulation	7
Pinball	16K Spec.	Winters	Game	*
Planet of Death	16K Spec.	Artic	Adven.	6
Planetoids	16K Spec.	Sinclair	Arcade	8
Polynomials	16K Spec.	University	Utility	8
Polynomials	16K ZX-81	University	Utility	
Pool	16K Spec.	Bug Byte	Game	7
Pre/early school cassettes	16K Spec.	Essex	Educ.	*
Primary Arithmetic	16K Spec.	Rose	Educ.	*
Primary Arithmetic	16K ZX-81	Rose	Educ.	*
Print Shop	16K Spec.	CCS	Simulation	8
Print Shop	16K ZX-81	CCS	Simulation	*
Pro-Golf	16K Spec.	Hornby	Game	7
Programmer's Dream	16K Spec.	Work Force	Utility	8
Programme Enhancement Package	16K ZX-81	R and R	Utility	*
Puckman	16K ZX-81	Hewson	Arcade	*
Purchase Ledger	16K ZX-81	Hestacrest	Bus.	*
Ramopoly	48K Spec.	J Fletcher	Game	*
Red Weed	48K Spec.	Lothlorian	Simulation	*
Regression	16K Spec.	University	Utility	8
Regression	16K ZX-81	University	Utility	*
Renumber Delete	16K Spec.	Work Force	Utility	*
Renumber Delete	16K ZX-81	Work Force	Utility	*
Rescue	48K Spec.	Computer Rent	Arcade	*
Reversi	16K Spec.	Sinclair	Traditional	8
Roulette	16K Spec.	Newsoft	Traditional	*
Roulette	48K Spec.	Dymond	Traditional	*
Sales Day Book	48K Spec.	Transform	Bus.	*
Sales Day Book	16K ZX-81	Transform	Bus.	*
Sales Ledger	16K ZX-81	Hestacrest	Bus.	*
Secret Valley	16K Spec.	Newsoft	Adven.	*
Secret Valley	16K ZX-81	Newsoft	Adven.	*
Self-teach Program	16K Spec.	Anvil	Educ.	*
Self-teach Program	16K ZX-81	Anvil	Educ.	*
Sentinel	16K Spec.	Abacus	Arcade	*
The Settler	16K Spec.	BSS	Utility	*
The Settler	16K ZX-81	BSS	Utility	*
Sideways Copy	16K ZX-81	D King	Utility	*
Sheepwalk	48K Spec.	Virgin	Game	7
Ship of Doom	48K Spec.	Artic	Adven.	7
Shiva Special 1	16K Spec.	Shiva	Games	*
Shopping List	16K Spec.	SD	Utility	*
Sky Raider	16K Spec.	C M Smith	Arcade	*
Slippery Sid	16K Spec.	Silversoft	Arcade	8
Slow Loader	16K Spec.	ELR	Utility	9
Snail Logo	48K Spec.	CP	Language	*
Softalk 1	48K Spec.	CP	Utility	*
Softalk 2	48K Spec.	CP	Utility	*
Solo Whist	16K Spec.	Video Soft.	Traditional	*
Sound FX	16K Spec.	D K Tronics	Utility	6
Space Fighter	16K Spec.	Winters	Arcade	*
Space Intruders	16K Spec.	QS	Arcade	7
Space Raiders	16K Spec.	Sinclair	Arcade	6
Space Raiders	16K ZX-81	Sinclair	Arcade	*
Space Trek	16K ZX-81	JRS	Arcade	*
Space Zombies	16K Spec.	Mikro-Gen	Arcade	*
Speak and Spell	48K Spec.	S and G	Educ.	*
Spec. Assembler	48K Spec.	Artic	Utility	*
Spec. Bug	16K Spec.	Artic	Utility	*
Spec. Tape Copier	16K Spec.	S Giza	Utility	*
Spec. Compiler	48k Spec.	Softek	Utility	7
Spec.Editor/ Assembler	16K Spec.	Picturesque	Utility	8
Spec. Forth	48K Spec.	Abersoft	Language	9
Spec. Forth	48K Spec.	CP	Utililty	*
Spec. Frogs/ Showdown	16K Spec.	Artic	Arcade	*
Spec. Gobbleman	16K Spec.		Arcade	*
Spec. Invaders	16K Spec.	Artic	Arcade	*
Spec. Invasion Force	16K Spec.	Artic	Arcade	*
Spec. Microchess	16K Spec.	Artic	Traditional	*

Cassette Round-up

Name	Machine	Company	Type	Gilbert factor
Spec. Monitor	16K Spec.	Picturesque	Utility	8
Spec. Scramble	16K Spec.	Work Force	Arcade	7
Spec. Sound	16K Spec.	M Afzal	Utility	*
Spellbin	16K Spec.	Startersoft	Educ.	*
Spookyman	16K Spec.	Abbex	Arcade	7
Spreadsheet	48K Spec.	MICROL	Bus.	7
Superchess II	48K Spec.	CP	Traditional	8
Super Play I	16K Spec.	Video	Games	*
Tai	16K ZX-81	PSS	Game	*
Tank Battle	16K Spec.	D K Tronics	Game	8
Tape Breaker	16K Spec.	Spectrasoft	Utility	*
Tasword	48K Spec.	Tasman	Bus.	8
Tasworld II	48K Spec.	Tasman	Bus.	9
Teacheraid	16K Spec.	B Farris	Educ.	*
Teach Data	48K Spec.	B Farris	Educ.	*
Tennis	16K Spec.	Winters	Game	*
Tenpin	16K ZX-81	Phipps	Game	*
Test Match	48K Spec.	Computer Ren.	Game	*
The Orb	48K Spec.	Adven.	Com. Ren.	*
The Great Western	16K Spec.	Game	New Soft	*
The Great Western	16K ZX-81	Game	New Soft	*
Time Bandits	16K Spec.	Adven.	New Soft	*
Time Bandits	16K ZX-81	Adven.	New Soft	*
Time Gate	48K Spec.	Arcade	QS	8
Tomb of Dracula	48K Spec.	Adven.	Felix	*
Tomb of Dracula	16K ZX-81	Adven.	Felix	*
Trace	16K Spec.	Utility	Zen	*
Transylvanian Tower	48K Spec.	Adven.	Shepherd	*
Troon	48K Spec.	Game	Hornby	8
Tube Train Terror	48K Spec.	Game	JRS	*
3D Tunnel	48K Spec.	Arcade	New Gen.	9
The Turk	48K Spec.	Traditional	OCP	8
Use and Learn	16K Spec.	Utility	MiCROL	8
Velnor's Lair	48K Spec.	Adven.	QS	8
Voice Chess	48K Spec.	Traditional	Artic	9
Volcanic Dungeon	16K ZX-81	Adven.	Carnell	*
Volcanic Dungeon	48K Spec.	Adven.	Carnell	6
Vu-Calc	16K Spec.	Bus.	Sinclair	7
Vu-File	16K Spec.	Bus.	Sinclair	8
Vu3D	48K Spec.	Utility	Sinclair	8
Warlord	48K Spec.	Simulation	Lothlorian	*
Wizard's Warriors	16K Spec.	Arcade	Abersoft	*
Word Fit	16K ZX-81	Game	Ram Writer	6
Word Processor	48K Spec.	Bus.	MiCROL	*
World Info	48K Spec.	Utility	Wimsoft	*
X Ray	16K Spec.	Utility	Zen	*
Yahtzi	48K Spec.	Traditional	Work Force	*
Yomp	16K Spec.	Arcade	Virgin	7
Zodiac I	16K ZX-81	Utility	Stellar	*
Zodiac II	16K ZX-81	Utility	Stellar	*
Zodiac F	48K Spec.	Utility	Stellar	7
ZXAS	16K ZX-81	Utility	Bug Byte	*
ZX-Bug	16K ZX-81	Utility	Artic	*
ZX-Chess I	16K ZX-81	Traditional	Artic	*
ZX-Chess II	48K Spec.	Traditional	Artic	*
ZX 1K Chess	1K ZX-81	Traditional	Artic	*
ZX Compiler	16K ZX-81	Utility	Silversoft	*
ZXDB	16K ZX-81	Utility	Bug Byte	*
ZX Draughts	48K Spec.	Traditional	CP	*
ZXED	16K Spec.	Utility	D K Tronics	*
ZX Forth	16K ZX-81	Language	Artic	8
ZX Forth	48K Spec.	Language	Artic	8
ZX-81 1K Games Pack	1K ZXZ-81	Games	Crystal	9
ZX Invasion Force	16K ZX-81	Arcade	Artic	*
ZX-81 Pocket Book	16K ZX-81	Games	Phipps	*
ZX-81 Remload	16K-64K ZX-81	Utility	Picturesque	*
ZX Screenkit	4K-64K ZX-81	Utility	Picturesque	*
ZX-sideprint	16K ZX-81	Utility	Microsphere	*
Zuckman	16K ZX-81	Arcade	DJL	8

Kemp Limited

"On a large computer system a file of this nature would cost between £150–£700."

The above quote from one of the U.K.'s major software wholesalers on one of our programs confirms our belief that we offer the best business software on the Spectrum. Our software has been professionally designed and tested over a considerable period of time and is now available NATIONWIDE. No other Spectrum software offers the same range of facilities and none has received such high praise.

Sales Ledger	Up to 1250 entries per month
Purchase Ledger	,,
Stock Ledger	,,
Stock Control	Unlimited entries

Only £14.95 each (48K Spectrum only)

Available at Selfridges and at all good computer shops. Available shortly on Micronet 800.

Nationwide wholesale distribution by Microdealer U.K. and P.C.S. Distribution.

Kemp Limited, 43 Muswell Hill, London N10 3PN

Dealer Hotline 01-444 5499

MAIL ORDER PROTECTION SCHEME

Advertisements in this magazine are required to conform to the British Code of Advertising Practice. In respect of mail order advertisements where money is sought in advance of the despatch of goods the Code requires the advertiser to despatch goods within 28 days, unless a longer period is stated. Where goods are returned to an advertiser, undamaged, within 7 days, the purchaser's money must be refunded, plus the cost of returning the goods. The reader should retain evidence of despatch.

If you order goods from mail order advertisements in this magazine and pay in advance of delivery you will be considered for compensation under the Scheme if the advertiser becomes insolvent or ceases to trade provided that:

(a) you have not received the goods, or a refund in respect of returning same, AND:

(b) you write to the Advertisement Manager of this magazine, stating the facts, not earlier than 28 days from the date of the order and NOT LATER THAN THREE MONTHS from the date on which the advertisement appeared.

THE SCHEME ONLY COVERS ADVANCE PAYMENT SENT IN DIRECT RESPONSE TO AN ADVERTISEMENT IN THIS MAGAZINE. IT DOES NOT COVER:—

(a) Classified advertising;

(b) payment made in response to catalogues, brochures, etc. received as a result of responding to such advertisements;

(c) advertisers offering services as opposed to goods,

(d) claims where payment is made with Access or Barclaycard and where the cost of the goods is over £30. In this case claims should be made to the Credit Card Company concerned.

Full details of the Scheme are available by sending a stamped and addressed envelope to Mail Order Protection Scheme, Newspaper Publishers Association Limited, 6 Bouverie Street, London EC4Y 8AY.

sinclair supermart

ZX81 SPECTRUM, DRAGON, BBC AND VIC SOFTWARE LENDING LIBRARY

We have for hire from 50p (inc. post) programs for your computer.

£5 life membership (less than the cost of a single game) brings you the SOFTWARE LENDING LIBRARY membership kit, catalogue and news letter.

Send cheque or PO for £5 to:
SOFTWARE LENDING LIBRARY
PO Box 3, Castleford, West Yorks
Stating name, address and computer type.
All tapes used with manufacturers' permission.

ZX-81 CASSETTE FAST LOAD SAVE and TAPE LOADING AID

Get your cassette really working MINIMUM 10 times ordinary SAVE speed UP TO 20 times on good recorders NO hardware "add ons".
All memory sizes (eg 16K, 32K and 64K) FAST VERIFY. FAST MACHINE CODE SAVE (save any part or all of memory). TAPE LOADING AID see the levels you really get off tape.
Just £6 or £3 Loading Aid alone. Details 50p, refund against purchase.

MUSAMY SW
11 Brettenham Avenue, Walthamstow,
London E17 5DG.

★★UTILITY FILE★★

This tape contains 2 quality programs for the ZX Spectrum 48K.
★**GENERAL FILE** – a versatile database for indexing collections, inventories, names and addresses/tel nos and so on. Stores 200 records per file.
★**PAGEPRO** – an easy method of storing/printing pages of information. Use for letters, text, memos, lists etc. Both programs have full user facilities and output to screen or ZX printer. Supplied double-recorded on cassette with instruction leaflet. Send cheque/PO for £9.95 (inclusive) to:
Dept SIO, **SD MICRO SYSTEMS**,
PO Box 24, Hitchin, Herts SG4 0AE.

aspic TIMEPLAN

is a comprehensive, user-friendly, wall-chart type program to help organise your time for up to two years ahead. Time allocated to various tasks is easily altered and repositioned, and an automatic reminder list facility is provided. Despite its extensive facilities and flexibility the program is very easy to use.
The extent of TIMEPLAN makes it suitable for 48K SPECTRUM **ONLY**.

Available (with manual) for £11.95 from

ASPIC, FREEPOST (no stamp needed),
Solihull, B92 7BR, West Midlands

CARIBBEAN TRADER 48K SPECTRUM

Attempt to amass a fortune, trading in illegal goods. Includes crew strength, pirates, rebels, coast-guards, bribery etc. 3 levels of play, hi-score, moving graphics. Highly addictive. £5.95.

WHO DARES WINS 48K SPECTRUM

An exciting S.A.S. chase set in the Argentine. £4.95.

KING ARTHUR 48K SPECTRUM

An amusing union simulation, £4.95.

All games supplied on quality computer cassettes. Cheques/P.O.s to:
EAST MIDLANDS SOFTWARE
SALES DEPT.
54 RYECROFT STREET
STAPLEFORD, NOTTS NG9 8AX

TO HELP YOU

WIN THE POOLS

"POOLSDATA" results database.
Complete record of all English Football League results 1978–83. The teams, scores and actual date of over 10,000 matches, for your analysis. Simple format, with starter analysis programs and guidance notes.
Spectrum/ZX-81 (16K)
Tapes (2 years data) £7.50
Tapes (5 years data) £12.50

"POOLSWINNER" pools predictor.
Flexible, updatable prediction program which references an integral **10 year** database. Predicts draws, aways or homes. Can be tuned to your own unique formula, or used in simple mode.
Spectrum/ZX-81 (16K)
£15.00

S.A.E. for details or send cheques/POs to:
Selec Software
37 Councillor Lane
Cheadle
Cheshire

Phone | Phone

SPECTRUM REPAIR SERVICE VERY FAST

Send your faulty Spectrum, briefly describing faults to:

Trident Enterprises Ltd,
37 Linden House,
Common Road,
Langley, Slough,
Berks SL3 8TT

or Phone Slough (0753) 48785 Monday to Saturday. Only £12.50 + Parts and Postage. We also repair all Commodore Systems.

ARE YOU SCATTERBRAINED?

Do you find your thoughts going off in unexpected directions? Do you often lose your train of thought completely? Play

SCATTERBRAIN!

and try to get rid of the mental blocks that stop you thinking straight! An absorbing and challenging game of logic and deduction for 1 or 2 players. 9 levels of difficulty. Action replay. Full instructions and demonstration. For 48K Spectrum. £5.95 incl. P&P from

MANOR SOFTWARE
24 Manor Gardens,
London SW20 9AB

ZX-81 REPAIR SERVICE

At last no need to wait for weeks, send your faulty ZX-81 for a fast reliable repair.
We will repair any ZX-81 kit or Ready Built Unit.
Please describe the fault briefly and send a cheque/postal order to:
NEXT COMPUTER SYSTEMS
88 Harvest Road
Englefield Green
Surrey TW20 0QR
ONLY £15.95 + p&p £1.75
fully guaranteed

ANVIL COMPUTING

SUPER8 NEW SELF TEACH PROGRAM

For ZX-81 (16K), Spectrum, TRS80, Video Genie.

★Now you can learn basic fast and efficiently★

★Forget your past programming problems. This program will make it all clear★

★ ★ ★ ★ ★ ★ ★

Cover Arrays, Sorting, Searching, Counting, Decision making tests, Error Trapping, Menu driving etc. You start with short simple programs and build up to full working programs with everything explained in full, precise detail.

★ ★ ★ ★ ★ ★ ★

★This is *NOT* a program you simply copy and run.★
★★ *YOU HAVE GOT TO WORK!!* ★★
But it is written in such a way that you can not get stuck.

★ ★ ★ ★ ★ ★ ★

This program has been fully tested over the past six months by 50 domestic and small business users and we have not received any adverse reports.

★ ★ ★ ★ ★ ★ ★

This program is our own product and is not available from any other source. Full money back guarantee. **£4.75** incl. Postage & Packing (state which computer).

51 Whitcliffe Lane, Ripon, Yorks HG4 2LB.

THIS'LL TEACH YOU A LESSON!!

(...or two)

GCE O LEVEL/CSE Cassettes for the **48K SPECTRUM** with COLOUR and MOVING GRAPHICS

PHYSICS 6 Programs for £6·50
※ Solids, Liquids and Gases ※ Graphs of Motion
※ Vectors and Scalars ※ Gravity, Weight and Friction
※ Acceleration ※ Newtons Laws

CHEMISTRY 6 Programs for £6·50
※ Chemical Change ※ Chemical Combination and the Mole
※ Types of Reaction ※ Chemical Equilibrium
※ Rate of Reaction ※ Energy Changes

OR BOTH for £12

Cheque/PO (payee THINK TANK) to:
think tank *Educational Software*
Dept SU10, 35 Wellington Road, Wimbledon Park, London SW19 8EQ

IVYSOFT

Has moved to new premises known as the Software Shop.

36 New Street,
Barbican,
Plymouth.
0752 671606

We have probably the widest range of Spectrum, ZX-81 software in the South West, with over 300 titles.
Phone or send SAE for full price list.

Spectrum 16K only £97.95
48K only £127.95
ZX-81 + 16K only £44.00

Export orders at TAX FREE price.

VISA | ACCESS

PCW 29th Sept – 2nd October
Stand 462

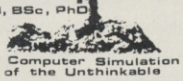
STOP PRESS.....
16 YEAR-OLD COMPUTER FREAK ACCIDENTLY STARTS WORLD WAR III
Innocent wargame triggers holocaust

TODAY'S FICTION
TOMORROW'S REALITY?

for the 16K or 48K SPECTRUM
£4

NUKESCAN

Author
T. Stygall, BSc, PhD



A Computer Simulation of the Unthinkable

WARNING: NUKESCAN is NOT a game. Using information released by NATO and the US Dept of Defense, it analyses the effects of a full nuclear strike against England, Scotland and Wales. Read-outs at user specified locations. Choice of 4 wind directions.

£4 from **MINATRON COMPUTING**
34 Pinewood Close
Westbury-on-Trym
Bristol BS9 4AJ

SELEC SOFTWARE

ZX-81 MACHINE CODE SPECIALISTS

1K ZX-81 GAMES
THE BEST AVAILABLE

TICK

- MAZE GUZZLER/SUPERBREAKOUT ☐
  Superb Full Feature maze-chaser game, plus big-screen Breakout. **£3.50**
- THE INVADERS/TIMEBOMB ☐
  Original space invaders, plus a new spine-chilling game. **£3.50**
- ZX-PANIC/ZX-SQUASH ☐
  Two new big screen all action games. **£3.50**
- FREE CATALOGUE ☐

Please send the items ticked to:

Name .....

Address .....

.....

.....

I enclose cheque/PO for £.....

SELEC SOFTWARE

37 Councillor Lane,
Cheadle, Cheshire
061-428 7425

HOME STUDY LTD.

PROGRAMS AND DETAILS FROM:
TRELEIGH WOODS FARM
REDRUTH CORNWALL

48K SPECTRUM
PHYSICS 'O' LEVEL A.E.B. Syllabus 052 1983/4

8	TEACHING PROGRAMS (including games) C30 (EXCELLENT FOR ALL SYLLABUSES)		£8.40
8	PAPER 1 (multiple choice) PROGRAMS 400 questions	(C30)	£5.15
13	PAPER 2 (practical) PROGRAMS 39 questions	(C30)	£5.15
8	PAPER 3 (theory) PROGRAMS 128 questions	(C30)	£5.15

All programs feature instant answers, instant explanations, probable grade estimate.

WHEN YOU BUY THE COMPLETE SET (2 × C60) £22.00

WE GUARANTEE YOUR EXAMINATION SUCCESS

OR WE WILL REFUND THE FULL PURCHASE PRICE

BORED WITH ARCADE GAMES??

—2 Addictive Simulation Games for the 48K Spectrum—

GANGSTERS
(SPECTRUM 48K)

A game of Strategy and Skill

The year is 1920: cast in the role of a small-time American gangster, your challenge is to seize control of the City from rival gang leaders, whilst avoiding the long arm of the law! Special features include:—

● City Map ● Murder Mode ● Shoot and bribe your way out of trouble ● Organise raids ● Shop rivals ● Beware, your rivals will develop their own strategies to unseat you! ● A complex programme which just fits into 48K ● 9 levels of difficulty.

BREWERY
(SPECTRUM 48K)

A Management Simulation Game

A complex and comprehensive business game — fun too! You are the owner of a small local brewery and 20 pubs. Your objective is to successfully expand Turnover and Profits, and become as big as Bass or Courage. But you'll need to exercise all your business skills to make it. Features include:—

● Plan advertising, pricing and production strategies ● Negotiate purchase of pubs ● Deal with Union wage claims ● Expand production facilities ● Save Game facility ● And much more!

Each game costs £5.95 including P&P, and is available from:—

P. BOULTON SOFTWARE, Dept SU, 54 Grange Road, South Harrow, Middlesex HA2 0LW.

Tune your TV for optimum performance by using "TV COLOUR TUNE"—an educational and instructive program for the 48K Spectrum giving CROSS HATCH and COLOUR-BAR SIGNALS with relevant back-up of the physics of colour TV transmission

£3.75 each, or get one

FREE

with every 3 titles ordered

CHESS	48K ARTIC	£9.45
CHESS PLAYER	48K QS	£6.95
TIMEGATE	48K QS	£6.95
MINED OUT	48K QS	£4.95
STAR TREK	48K R+R	£4.95
MICRO CHESS	16K ARTIC	£6.95
GOBBLEMAN	16K ARTIC	£4.95
GOLF	16K R+R	£3.75
SPACE INTRUDER	16K QS	£4.95
METEOR STORM	16K QS	£4.95

We are now a major source of EDUCATIONAL programs ranging from INFANT to CSE/GCE. Top rate service and comprehensive supply only from:

LOCATOR, 12 Fernhall Drive, Redbridge, Essex 1G4 5BN. Tel: 01-550 5575.

CASSETTE RECORDER

Compatible with ZX-81, Spectrum and many other computers.

Features:
- Tape Counter
- MIC, Ear and Rem Sockets
- 5 pin DIN socket
- Volume Control
- Batteries/Mains
- 12 months' manufacturer's guarantee.

Connects with leads supplied by Sinclair.

Money back guarantee if returned undamaged within 28 days.

Price: £22.95 (including P&P).

Cheques/money orders to:

Leyden Enterprises
41 Broomgrove Gardens
Edgware, Middlesex

TECHNICAL GRAPHICS PROGRAM 48K

Draws horizontal, vertical and Isometric lines, full or dotted. Draws in Perspective with variable horizon. Draws plane circles and Isometric circles. Prints on screen at any position, saves screen etc. £5.00 Cheque/PO to J. W. A. van Lopik, B. Tech, Sunny Croft, Wrelton, Pickering, N. Yorks.

CENTRONICS SERIES 100 PRINTER. Standard Centronics plus optional RS232 interface, until recently coupled to PDP mainframe. £150 or nearest offer. Contact (King) on Tonbridge 358180 (evenings only).

ZX-81 16K. As new with manual leads etc. plus 16 tapes including Football Manager, Scramble, Galaxians, Planet of Death, Ship of Doom. Bargain at £75 o.n.o. 021-454 9698.

LEARN YOUR TABLES! 16/48K Spectrum. 13 programs with self-test. Only £2.75 from Sharma Software, 12 Barrington Court, Brentwood, Essex CM13 1AX.

SPECTRUM TAPE EXCHANGES. Exchange your unwanted Spectrum software for only £1.00 each tape. Send s.a.e. for list and details to 34 Avondale Road, Nelson, Lancs BB9 0DA.

WRITE YOUR OWN HRG programs on 1K ZX81. No hardware required. Tape with instructions and sample programs. £3.65 from P. Nixon, 129 Richmond Road, Cambridge CB4 3PS.

"READ". The 48K Spectrum program for children, and adults, with reading difficulties. Written by teachers. Suitable classroom or home. £10 or s.a.e. for details. JBS, 44 Haslam Crescent, Bexhill, Sussex.

NAME THAT SONG! Spectrums (48K or 16K) 100+ songs. Different game each time. Bid a Note; Spin the Wheel and the Clock. £4.95. Whizz Quiz, St Paul's Road, Birmingham B12 8LZ.

SPECTRUM 16K. Why pay the earth for quality games? Four m/c and basic games on one tape. Frogger, Golf, Lander, Missile-Attack. £4.50. Liam Data, 65 Fullerton Place, Gateshead NE9.

ZX-81 16K COMPLETE with 12 top games tapes including "3D Monster Maze", "3D Defender". All for £55. Contact T. Pulham, phone 01-729 2391.

16K ZX-81 WITH JOYSTICK and Memotech keyboard plus 18 tapes, 2 books and graphics jotter. £100 o.n.o. Tel: 01-301 0422.

SPECTRUM 48K Boxed £90. Fuller Master sound box £25. Free Galaxy 1000 and case if sold together. 061-790 7838.

SINCLAIR SPECTRUM 48K, plus 'Timegate' hardly used. Genuine reason for sale, £100 or best offer accepted phone 393-1735.

16/48K SPECTRUM elementary maths. Addition, subtraction, multiplication, division and tables. Suitable for children from 4-8 years. Extremely easy to use. £4.00. SCS, 40 Castle Road, Sherborne, Dorset, DT9 3RP.

16K ZX-81, many games arcade and adventure. Including the first class 16K game Flight Simulation and Adventure B, including Treasure. This amazing offer is all for £40. Don't miss it. Brendan Johnston, 1 Roslings Close, Chelmsford, Essex CM1 2HA.Tel: Chelmsford 59707.

EARLY LEARNING (Spectrum 16K). Two educational games programs written by a teacher for 4 to 7 year olds. Includes snap, golf, clock, easy sums and reading. £4.99. R. Ritchie, 52 Leopold Road, Bristol BS6 5BS.

KEMPSTON JOYSTICK owners. Convert 1 will enable you to use your joystick and 48K Spectrum to play Arcadia, Schizoids, Molar Maul and Ah Diddums. Simple to use. £3.45. S. Horner, 32 Gladstone Road, Hockley, Essex.

16K ZX-81 "Personal Top 30": input your selections then you and friends vote. Automatic listing and weekly update. Cassette and instructions. £3.50 from A.M.C., 73 Sandy Lane, Cove, Farnborough, Hants.

ZX-81 WITH DK TRONICS keyboard and 16K Rampack, various programs, books etc (BBC Micro forces sale). £75. Phone 01-485 5196.

SPECTRUM GAMES! Over 50 titles. Arcade, Fantasy, Adventure, Strategy, Wargames, Mindgames. Buy five, choose one free title. Send 2×16p stamps for catalogue. Softspot (S.U.), 2 Rectory Gardens, London SW4 0EF.

SAVETAX SPECTRUM screen change any detail. Infinite changes saveable. 83/84 paye built-in. Calculate, print, copy assessments full taxman format. Coding calculations. Miras relief £5. B. White, 6, Hawksway, Heswall, Merseyside.

PRE-SCHOOL/EARLY SCHOOL CASSETTE suitable school/home. 7 Educational/stimulating programs for children 4-44 yrs! **Written by teachers**. 16K/48K Spectrum. £5 cheque/PO to Essex Software, Dept 1, 16 Huntsmans Drive, Upminster, Essex.

THE NEW 'FATHERBOARD' portable personal computer 24×12" all model Console £12.50 plus p.p. £1.50. Attachable manual/copyholder £2.50 extra or send S.A.E. for details. CENSCOT, 25 Laurelhill Place, Stirling FK8 2JJ.

40×24 SCREEN for ZX Spectrum. No POKES or GOSUBS: just uses normal PRINT commands. Makes display very neat. £3.99. Cheques/POs to P. K. Bown, 38 Berton Close, Blunsdon, Swindon, Wilts. SN2 4BE.

ZANY-APE AND WACKMAN. Two arcade style games for the 16K Spectrum. Send £2.95 to 'Machrosoft', Glenville House, Ulcombe, Maidstone, Kent ME17 1DU. Cheques payable to T. R. Roberts. Phone (0622) 842823.

SPECTRUM 16/48K. 12 games for only £4 inc. P&P. Tron, Pontoon, Logo, Pekman, Centipede, Kingdom, Tune, Star, Mazer, Sheepdog, Bomber, Runway. Loach Software, 8 Cottesford Close, Hadleigh IP7 5JA.

ZX-81 16K RAM (uncased) £11.95 plus 85p post. Send s.a.e. for details of this and other bargain offers. HOWARD ASSOCIATES, 59 Oatlands Avenue, Weybridge, Surrey KT13 9SU.

16K ZX-81 34 software tapes including war board game Conflict, five books worth over £260 sell for £100. Phone Mr Wallace 031-657 2438 after six p.m. Deliver Edinburgh and Borders.

FOR SALE 16K ZX-81 with one year guarantee; Arcade and Management Games Cassettes; Keyboard Bleeper (unfitted); Video Inverter (unfitted); ZX-81 Programming Books; 'Sinclair Programs' Magazines (free). Details from: PKZ, Flat 11, 37 Westbourne Terrace, London W2 3UR.

Reach an estimated readership of over 200,000 users per month for as little as £2.00*.

Or if you are starting your own small business advertise in the supermart for only £10.00.

Yes all you have to do is fill in the coupon below including your name, address and/or telephone number and send to: Supermart, Sinclair User, ECC Publications, 196-200 Balls Pond Road, London N1 4AQ.

Maximum 30 words.

Your advert will appear in the earliest possible edition.

Name .....

Address .....

..... Tel: .....

Have you included the fee of £2.00 or £10.00?

***for second hand sales only**

Conditions
The Advertisement Manager reserves the right to alter, reject or suspend an advertisement without assigning any reason. Advertisements are accepted subject to approval of copy and to the right of the Advertisement Manager to alter, reject or cancel any order without explanation. The Proprietors are not liable for any loss from any cause whatever, nor do they accept liability for printers' errors. The Advertisers shall indemnify the Publishers in respect of any claim, cost and expenses arising out of any libellous or malicious matter or untrue statement in any advertisement published for the advertisers, or any infringement of copyright, patent or design therein. The placing of any order will be deemed to be an acceptance of these conditions.

Advertisement Index

AGF Hardware 52, 53
Abacus Electronics 124
Abersoft 42
Addictive Games 22
Afdec Electronics Ltd 119
Akintech Engineering Ltd 124
Arcade Software 79
Artic Computing 7
Ash Micro Services 33
Bridge Software 103
Bridgemaster 33
Buffer Micro Shop 51
CCS 45
CP Software 87
CRL 43
Calpac Computer Software 130
Cambridge Computer Store 128
Cambridge Computing 6
Campbell Systems 86
Carnell Software Ltd 40, 41
Chalksoft Ltd 51
Cheetah Marketing 58
Computer Add-Ons 60, 61
Computerlock 86
Crystal Computing 123
DJL Software 44
Datel Electronics 102
Dean Electronics 103
East London Robotics 24, 25, 47
FB Tronics 125
Fantasy Software 26
Felix Software 80
File Sixty 109
Fox Electronics 50
Fuller Micro Systems 90, 91
Gemtime Software 83
Gilsoft 97
Greye, J K Enterprises 8
Harley Systems Ltd 89
Hartland Software 127
Hestacrest Ltd 42
Hewson Consultants 36
Hilderbay 8
Hilton Computer Services 83
Hornby Software 91
Incentive Software 80
Interface 125
Interservice Electronics 122
JRS Software 128
K-Ram 102
Kelwood Heating Ltd 89
Kemp Ltd 136
Kempston (Micro) Electronics 2
Kernow Software Services 103
Legend 34, 35
Load Runner 131
MC Lothlorien 89
Macquillan Electronics 124
Magenta Electronics Ltd 86
Magnetic Magazine 81
Maplin 9
Melbourne House 56, 57, 104, 105
Memotech 98
Micro-Z Ltd 88
Micro Master 110
Micro Power 33
Micromega 82
Microsphere 88
Mikro Gen 83
Myrmidon Software 125
McAlley, B S 130
National Extension College 127
New Generation Software 23
Northern Premier Exhibitions 44
Odyssey Computing 91
Orwin Software 134
Oxford Computer Publishing 80
PSS 139
Phipps Associates 92
Picturesque 22
Print & Plotter 4
Protek Computing Ltd 10
Quicksilva 140
R & R Software 22
SMT Rotronics 18
Servodata Ltd 88
Richard Shepherd Software 100, 101
Silversoft 46
Sinclair Research Ltd 115-118
Softeach 13
Softek 54, 62
Software Cottage 96
Software Library 124
Software Supermarket 21
Software Workshop 132, 133
Supermart 137, 138
Tasman Software 97
Texgate Computers 97
Transform Ltd 96
Tutorial Software 110
U Microcomputers 95
University Software 238
Visions (Software Factory) 59
Watson Software Services 44
Widgit Software 42
Winters Ltd 96
Work Force 14

PANIC

"It must be a nightmare" he screamed as he ran around the maze of floors, desperately climbing ladders to different levels in a vain attempt to evade the monsters.
He had only his neutron hammer to dig holes for the vile creatures to fall into, but even then he had to repeatedly hit them before they dropped to their deaths. As if that wasn't bad enough, the oxygen supply was running out!
"It's simply impossible" he wailed as the monsters advanced on all sides. .

SPECTRUM 48K
£5·95

Arcade Action For Spectrum, & ZX81

MAZE DEATH RACE

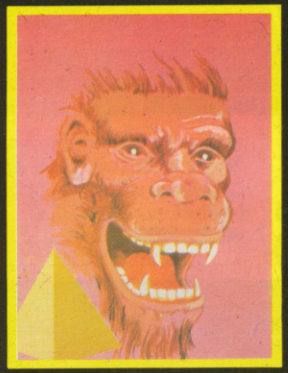
Drive your 500b.h.p. racing car around a giant maze (9 times the size of the TV screen on the ZX81 version, 32 times for the spectrum). Watch out for the hazards – oil, ice, fallen rocks etc. Not the least of your worries are the chase cars also in the maze – one touch with these means instant death!

ZX81 16K 3·95
SPECTRUM 48K 4·95

KRAZY KONG

Can you rescue Jane from the evil clutches of KRAZY KONG? Fight your way through three screens of fire-balls, barrels and conveyor belts to the top of the girders and save the damsel in distress. Entirely written in machine code to give super fast arcade action.

ZX81 16K 3·95
SPECTRUM 48K 5·95



ELEKTRO STORM

Earth is under attack from wave after wave of intergalactic missiles – your mission is to blast them out of the sky with your laser cannon before the whole human race is wiped out.

SPECTRUM 48K 5·95

PSS

HOPPER

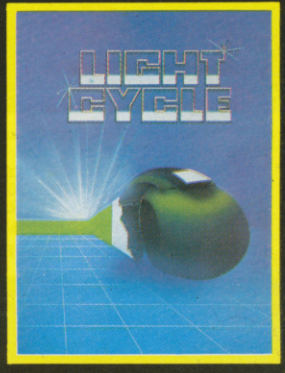
Help FERGUS and his friends across the highway avoiding the traffic, and then over the treacherous river on the backs of turtles and logs to the safety of the lilly pond.
Features include: 6 lanes of traffic, diving turtles, crocodiles & flies.

ZX81 16K 3·95
SPECTRUM
16K 48K 5·95

LIGHT CYCLE

The MASTER CONTROL PROGRAM has ordered you to race your light cycle on the infamous grid. This is an incredibly fast, adrenalin pumping game that is very addictive. There is an option to race against either another player or the computer – but we warn you its very very good!

SPECTRUM
16K 48K 5·95



FOR INSTANT CREDIT CARD SALES TEL (0203)667556, SEND CHEQUE OR P.O. TO P.S.S. 452 STONEY STANTON RD. COVENTRY CV6 5DG.
TRADE ENQUIRIES CONTACT JOHN FLETCHER, COVENTRY (0203) 81346

AQUAPLANE
Aquatic Action!!
From the Author of Time-Gate

FREE UNIVERSE WITH EVERY TAPE*

*OFFER SUBJECT TO AVAILABILITY

VELNOR'S LAIR
Lose yourself in the Goblin Labyrinth amongst Demons, Trolls, Undead and the Evil Wizard Velnor.
A Warriors and Wizards, Sword and Sorcery Adventure.
Runs in 48K on the Spectrum.
Author:
Derek Brewster of Neptune Computing.
£6.95

3D STRATEGY
A Monster of an **Unbeatable** game! A 'State of the Art' program. A battle of Nerves and Wits; Faster than a speeding bullet!! 100% machine code version of 3D noughts and crosses.
Runs in 16K on the Spectrum.
Author:
Freddy Vachha
£6.95

XADOM
Battle through a sophisticated alien maze in a search for the 'aartifact'.
A Unique **3D** Arcade Adventure.
Runs in 48K on the Spectrum.
Author:
Mike Moscoff
£6.95

'PICTURE PRODUCED WITH 'BEEB ART'.
BEEB ART
High Quality Art/ Design program for full versatile manipulation of the BBC's extensive graphics ability.
Paint, Draw, Abstract.
Instruction Book Included.
Runs in 32K on BBC Model 'B'.
Author:
Dave Mendes
£14.95

SMUGGLERS COVE
Falling through a concealed cave entrance you find yourself caught in a fable full of horror and Black Beard's Treasure . . .
An Historical Adventure with Hi-Res Graphics.
Runs on 48K on the Spectrum.
Author:
John Keneally
£6.95

AQUAPLANE
Ski thru' Marine Maniacs, G & T's, Regattas but beware the Great White Hungry!!
Unbelievable full screen display, continuous sound, 'impossible' colour.
Runs in 48K on the Spectrum.
Author: **John Hollis**
£6.95

QS™ THE GAME LORDS

AQUAPLANE 48K Spectrum	£6.95 ☐
XADOM 48K Spectrum	£6.95 ☐
VELNOR'S LAIR 48K Spectrum	£6.95 ☐
SMUGGLERS COVE 48K Spectrum	£6.95 ☐
3D STRATEGY 16K/48K Spectrum	£6.95 ☐
BEEB ART 32K BBC Model 'B'	£14.95 ☐

CREDIT CARD TELE SALES:
0202-891774
Access VISA

PLEASE SEND ME THE GAMES AS TICKED SUPPLIED ON CASSETTE
Total cheque/P.O. enclosed _____
Cheque payable to Quicksilva Limited
NAME _____
ADDRESS _____

WARNING: These programs are sold according to QUICKSILVA Ltd's terms of trade and conditions of sale. Copies of which are available on request.

Please send order to
QUICKSILVA MAIL ORDER:
55 Haviland Road
Ferndown Industrial Estate
Wimborne, Dorset

Send S.A.E. for Catalogue. QS Games are available through Boots, J. Menzies, Smiths, Hamleys, and all leading computer stores.

GSH

HEAD OFFICE: QUICKSILVA LIMITED, PALMERSTON PARK HOUSE, 13 PALMERSTON ROAD, SOUTHAMPTON SO1 1LL